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Student Motivation in the Urban Middle School Science Classroom

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Student Motivation in the Urban Middle School Science Classroom

**by Sarah Laiosa
August 2006**

**A thesis submitted to the
Department of Education and Human Development of the
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Student Motivation in the Urban Middle School Science Classroom

by Sarah Laiosa

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Abstract

Student motivation in any setting is difficult, but proves to be a unique challenge when dealing with urban middle school students. During my student teaching experience and my first year teaching in such a setting, I have found that it is extremely difficult to instill the importance of education in these students. This thesis focuses on the effects of teachers, peers, and administration on student motivation and incorporates strategies to improve motivation through a variety of techniques. At the completion of the research section of this thesis, I discovered that it was primarily the teacher that was responsible for the motivation of these students, as suggested during the literature review, with some motivation relying on peers and very little relying on administration. My study also suggests that a shift from a teacher centered to a student centered classroom, incorporation of cooperative work group strategies, and clear directions and expectations set forth by the teacher are key in instilling motivation in these students.

Table of Contents

Chapter One: Introduction.....	1
Problem Statement.....	1
Significance of the Problem.....	2
Purpose.....	2
Rationale.....	5
Summary.....	6
Chapter Two: Literature Review.....	7
Teacher Impact on Student Motivation.....	7
Peer Impact on Student Motivation.....	18
Administration Impact on Student Motivation.....	21
Chapter Three: Applications and Evaluation.....	23
Introduction.....	23
Participants.....	29
Procedures of Study.....	24
Candy Review Session.....	24
Science Fair.....	25
Instruments for Study.....	27
Chapter Four: Results.....	30
Beginning of the Year Survey.....	30
Late November Survey.....	31
Self Assessment Sheets and the “Candy Review”.....	36
4-point Likert Scale Survey	41
End of the Year Survey.....	45
Reflection, Video taping, and Lesson Plan Alterations.....	51
Science Fair.....	52
Chapter Five: Conclusions and Recommendations.....	55
Discussion.....	55
Action Plan.....	57
Recommendations for Future Research.....	59
Conclusions.....	60
References.....	61
Appendices.....	64
Student Survey.....	64
Survey from Early November.....	65
Self Assessment Sheets.....	74
End of First Semester Survey.....	75
First Week of May Survey.....	77
End of the Year Surveys.....	79
Sample Entry from Reflection Journal.....	87
Sample Lesson Alteration Following Review of Reflection Journal Entry and Video Tape Viewing.....	88
Energy Afternoon Project Packet.....	90
Judge’s Survey.....	104

List of Illustrations: Tables

Table 1. Pre-Candy Review Class Average Test Scores.....	38
Table 2. Post-Candy Review Class Average Test Scores.....	39
Table 3. Pre- and Post-Candy Review Class Test Averages Comparison.....	40

List of Illustrations: Figures

Figure 1. Results of 4-point Likert Scale Surveys.....	47
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Chapter 1: Introduction

One of the most difficult things that first year teachers have to deal with is classroom management. Classroom management is not just being able to keep your students in line. It is being able to anticipate problems before they happen. It is having a well planned lesson with five different back up plans for when something goes wrong. It is being able to govern a room with an iron fist and a smile. It is trying to figure out what it is that will keep your classroom running like a well oiled machine where student engagement and enthusiasm for the content is high while social contact is kept appropriate.

Problem Statement

By definition, classroom management is the ability of an educator to create an environment that is safe and conducive to learning. As simple as that sounds, it is much more than just a sentence on a piece of paper. When embarking on my student teaching experience, I was full of excitement and anticipation. I felt that I had been well trained and prepared for the classroom, but within a few hours of my first day I started to question everything I had been working for over the last several years. These middle school students had no desire to be in my class. They had an overall disdain for life which was projected through aggressive behavior towards their classmates, complete contempt for authority, and lack of respect for themselves and others.

These behaviors and lack of self control continued when I started in my own classroom in the same district. Students were more interested in inappropriate socialization and obscene actions than in their content. Even with a strong classroom management plan in place, I struggled to keep the students in line. To top it off, I had an

unsupportive administrator that seemed to want to make sure that I failed in my attempts in the classroom. How was I going to teach these kids when there was no desire to learn and the behaviors that they were partaking in were so violent and disrespectful? I started by trying to involve parents in the students' responsibilities.

Significance of the Problem

Upon making about 100 phone calls home, I started to understand that these kids had no structure at home and I had over half of the parent's tell me that "No, my kid doesn't need to stay after. They need to be home to baby-sit after school and I will press charges if my kids are refused their meals."

Student motivation progressively dropped and kids that were performing work at an A level, were now lucky if they were passing. Outrageous behavior became the norm for these students. I even had a kid bite me because he felt I had no authority over him. The students knew that I had no administrative support so they took advantage of this in every way they could. I was not progressing with these students. They were not learning the content they needed to learn and they were not learning the skills that they needed to become good students.

Purpose

As time went by, I spent numerous hours trying to figure out ways that I could get my classroom back. I started keeping daily reflection journals to help me focus on things that worked and didn't work in the classroom. My time teaching was now taken up by nothing more than crowd control. I had to revert to packets of individual seat work in order to be able to free myself up to deal with the kids fighting in the classroom, the wads of paper and rubber bands that were being flung at each other, and the threats and

language that these kids used towards each other. I felt that I had become nothing more than an overpaid babysitter and I realized this is not how I wanted to spend my career.

In October, I had my first formal observation from my administrator. It was with my honors class who in general were the best behaved of my groups. We had been working on molecular bonding, so I planned a lesson that took the concepts that we had been working on and had them create models of ionic and covalent bonds using paper, glue, and scissors. I begged a friend to come out and he and I were up until 4 am punching out the circles that students needed to complete their projects, individually bagging every piece so that everything could be handed out and they could get started. I had talked to the kids about the observation ahead of time, and reiterated classroom rules and expectation with them. We even went as far as practicing what was expected of them. I was confident that this was going to go well.

When the class was finished, I felt that things went well. The students were on task, worked well on their models, and really had the concepts down by the time that we were done. I had one student give me a bit of a hard time when I asked him to move his seat, but after the third time he complied. Many students were up out of their seats, doing their projects standing up or helping others that did not understand the concepts. The student that I had asked to move went back to his original seat because the people that he worked best with were in that area and he completed his work in a timely fashion and did not cause any more problems.

I received a below standards rating from my administrator, yet there was very little in the narrative that suggested that it was a below standards lesson or performance on my part. At the end, she listed a few things that I could have done differently, but

there was nothing there that should have gotten me a poor review. When the post observation was over, I took it to my mentor and explained what had happened. She was very upset with the rating, backing up my beliefs that there was nothing in the narrative that suggested a substandard performance on my part. Together my mentor and I came up with an action plan for me to work on improvements in the areas that my administrator had suggested, including taking the directive to video tape my lessons so that I could review and reflect on them in more detail than I had already been doing. We also composed a rebuttal to the observation, pointing out several flaws in the narrative, including the fact that the lesson I taught was on covalent bonding and the narrative that was given was all about ionic bonding which took up all of five minutes of the class.

With this plan in place I went back into my classes, completely self conscious of every move that I made and I started to see my feelings reflecting on the students. I was angry, confused, and very disheartened and these feelings came back at me through the work and behaviors of my students. The four classes I taught after the post observation were the four worst that I had all year. I was tense so my students were tense. I was angry and my students stepped up with feelings of complete obstinance towards me and anger towards their classmates. I had no joy left in teaching because I was concentrating so hard to make the classroom the way that my administrator wanted it that I forgot how it was that I wanted to run the classroom. There was no personal touch left to how I was teaching so the kids started producing work that had no reflection of their personalities and was nothing more than regurgitated material of which they took no pride in.

I went on teaching this way for about two weeks, and finally I approached my mentor and asked her for help. I explained everything that I had been doing and how I

was seeing the students fall progressively further away from me and what they were supposed to be doing. I did not feel like I was an effective teacher. I did not feel that my students were learning anything from me because I felt like my abilities as a teacher had been completely wiped out and I was nothing more than a pawn. I expressed my concerns over the student's work and told her that I was considering taking a long term sub position I had been offered just to get away from the administrator. Upon hearing this, my mentor advised that I start teaching the way that I felt comfortable doing and she would take up any repercussions with my administrator herself. I was to focus on keeping up with the directives that I was given but to find my own way of dealing with them, not my administrator's way.

Rationale

With this advice in place, I started listing off questions that impact my teaching and my students' learning and which I would like to see answered before the end of the year. I then narrowed my list down to one primary area with three focus questions that I would strive to improve upon and get answers to. Since my biggest eye opener had been the effect of my mood on my student's performance and motivation, I decided to focus on the use of motivation to improve classroom behaviors. I was curious to find out: a) How I impacted student motivation through lesson design and delivery, b) How the students affected each other with regards to motivation to perform in the classroom, and c) How administration impacted student motivation and performance in the classroom. Since I had been doing daily reflections in my journal, I decided to use these reflections coupled with student surveys and lessons designed to increase student accountability and engagement to understand and measure the students' classroom motivation.

Summary

Now having direction to my study, I was able to focus my reflection journals, video tape viewing, and lesson plan alterations to areas that stressed student motivation. I hypothesized that if motivation was increased then many of the classroom management issues would resolve themselves and I could focus on teaching the two encompassing lessons of the 7th grade; how to be a good student and their science curriculum. I started off the study with a comprehensive literature review, using my three focus questions as the anchor to this review, where I found many sound ideas and experiences that helped to shape the remainder of my study.

Chapter 2: Literature Review

How does a teacher impact student motivation?

“Effective learning in the classroom depends on the teacher’s ability...to maintain the interest that brought students to the course in the first place” (Ericksen, 1978, p.60). Even though Ericksen’s report is based on 10 years of research at a college level at the University of Michigan, his words ring very true even in today’s classrooms. He based his research on student and teacher surveys, interviews, and classroom observations. His findings, where very predictable, really concreted the idea that a lot of the student’s motivation was based on the instructor of the course. He reports that 95% of the students interviewed reported their success was determined by how well the instructor presented materials. There were an astonishing 75% of students who took a class outside of their majors based on recommendations by friends because of the reputation of the instructor; as many as 35% of student’s changed majors based on their experience with specific instructors. There were business majors that changed to English literature majors because of the instruction of one particular professor. There were students that took organic chemistry, one of the most demanding college courses offered, who continued on in a chemistry field instead of biology or physics because of the effectiveness of the instructor. And there were history majors that changed tracks to Political Science majors after a horrible experience with a particular professor.

Ericksen (1978) also concluded in his findings that many students felt that everyday teaching practices can do more to counter student apathy than special efforts to attack motivation directly. Most students respond positively to well-organized and planned courses taught by an enthusiastic educator who has shown genuine interest in

students and what they learned over professors who are obviously well educated in their field but do not show interest in student learning.

There have also been many studies conducted that have produced many general areas that teacher's can focus on to improve student motivation and in turn the overall classroom environment. A study done by Bligh (1971) set the stage for many specific areas of research in the coming years. Bligh focused his study on intrinsic motivational techniques and how to encourage students to become self-motivated independent learners. The findings concluded that positive feedback of student work and setting reasonable goals and expectations for students was the key to student success. Bligh's research was expanded on by Lowman (1948) with the addition of creating an open and positive atmosphere for students. The research of Bligh and Lowman was reaffirmed by Weinert & Kluwe (1987), where after hundreds of classroom observations, they reported that classrooms where student's were constantly reminded of how well they were doing were better behaved, more likely to stay on task, eager to participate in classroom discussions, and not afraid to ask questions. They further expanded on this after numerous student interviews which conveyed that students who felt they were valuable members of a learning community were more likely to enjoy school and sincerely want to achieve because they knew if they tried hard enough they would do well (Weinert & Kluwe, 1987). In 1990, Lucas took the study one step further by examining psychological models of students of various ages and added the value of helping students to find personal meaning in the materials and the creation of a learning environment that is open and positive. Lucas reported that students who were more likely to take a risk in the

classroom with regards to content were more likely to learn and stay on task than those that felt like there was constant pressure to always be correct.

Eccles et al. (1993) performed a study on the differences between the elementary and middle school educational demands. The basis of their study was a dramatic drop in student motivation and grades between grades 6 and 7. This fueled them to take a look at 75 middle schools and 58 elementary schools to find out what happened during that transition year. Their observations led them to the conclusion that middle schools are typically larger, less personal, and more formal than elementary schools. Middle grade teachers are often subject-matter specialists and typically instruct a much larger number of students than do elementary school teachers in self-contained classrooms, making it less likely that they will come to know students well, to believe students are trustworthy, and to grant them autonomy. Middle grade school classrooms, as compared to elementary school classrooms, are characterized by greater emphasis on teacher control and discipline; a less personal and positive teacher/student relationship; and fewer opportunities for student decision-making, choice, and self-management. Second, a shift to traditional middle grade schools is associated with an increase in practices such as whole class organization and public evaluation of the correctness of work. There are also increases in between-classroom ability groupings. In traditional middle grade schools, teachers often believe it is time to get serious about instruction and performance evaluation (Eccles, J.S., Wigfield, A., Midgley, C., Reuman, D., MacIver, D., & Feldlaufer, H., 1993). They concluded that this shift was made too quickly at this age level and many times led these students to act out and/or have difficulty coping. They also concluded that emphasis on things such as high stakes testing, public correctness,

and the lack of personal connections with their teachers leads to a decline in a student's desire to learn. They become more involved in the social aspect of school than the educational aspect because they are searching for footing somewhere in this upheaval of everything. Their peers become the only constant at school.

In another article, Guthrie and Davis (2003) refer briefly to Eccles et al. (1993) study which discusses the impact of students who have fallen through the cracks with regards to reading. Where this article was specific to how to handle struggling readers, it held a lot of value to the science classroom, as we are all considered reading teachers nowadays, and very few students who struggle with reading have a hard time in all subject areas. They report that "many struggling readers in middle school are disengaged from reading. In addition to low achievement, these students can have low motivation for reading and in turn all of their coursework" (Guthrie & Davis, 2003, p.65) They found that students who struggle with reading have often compensated for this in one of two ways; they act out in their classes causing much classroom disruption or they have developed ways to compensate for their weak areas. According to their research, Guthrie and Davis indicated that more than 70% of the time the students will respond with the first option, taking away from students who are there to learn. The rest of the time these struggling readers have developed memorization strategies where they are able to memorize content given orally in class and are able to regurgitate the materials in the exact words of the instructor when tested. Those that fall in that less than 30% bracket tend to excel in math and the sciences, have average performance in social studies, but struggle in English classes when reading and reading comprehension are the focus of the

curriculum. For this reason, it is hard to evaluate some of these students as struggling readers and often they are simply labeled as individuals who dislike English class.

Seifert (2004) takes a look at understanding student motivation through comparisons of different theories of motivation, but more specifically the differences between extrinsic and intrinsic motivation. He observed 90 classrooms throughout Canada and conducted student and teacher interviews when students were at a 7th grade level. He then returned to these same students 4 years later when they were seniors in high school. He asked questions based on content retention from 7th through 12th grades. Comparison of interview notes indicated that many of these students found extrinsic motivation to be key in their learning during middle school years but when asked to think back, 68% of the students reported that they retained information better when they found a center of intrinsic motivation. These results, coupled with questions pertaining to instructional methods of teachers found a whopping 89% of students reported their best learning from teachers that showed a genuine love of the subject and desire of the kids to learn that instilled that intrinsic motivation in the student to want to do well. When asked what affected behavior in their classes, 58% of students replied that they found themselves acting out and getting in trouble in classes where they were either bored or the teacher did not make things clear; students were unsure of teacher expectations. Almost all of the students reported incidences of misconduct in classrooms where they did not feel the teacher cared about them, and less than 10% of students referred to their parents as a means of support and motivation to behave and succeed (Seifert, 2004).

Another article dealt with the affects of testing, specifically high stakes testing, on student motivation. Harlen and Crick (2003) worked together to collect data on how

teachers felt standard-based curriculums affected their classrooms and the feelings of several students when it came to tests. They reported a 40% increase in the number of states that were using these high stakes tests from 1995 to 1998, and with this jump came a low response from teachers. They expressed that teachers are concerned that they spend all of their time teaching to the test; preparing their students to succeed through memorization instead of applying what they have been taught. Over 80% of the teachers interviewed expressed distaste for a standards-imposed curriculum and those that have been teaching for a number of years have seen a decline in student performance and classroom behaviors since the implementation of such testing practices. Most teachers feel that they lose the students to daily drills and aren't able to truly teach when such a structured curriculum exists.

Students came back with a lot of the same reactions. Many students were concerned about the fact that it was an unfair test due to numerous uncontrollable variables that occur each day. Other students felt that they were learning very little about their subject because teachers put too much emphasis on these tests. Still other students felt that the repetitive nature of preparing for these tests became very tiresome and extremely boring. Students would look for and find better ways to occupy their time during class. About 36% of the students reported that they got into more trouble and spent a good chunk of their class time trying to figure out ways to cause problems without getting caught rather than participating in activities they found dull and boring (Harlen & Crick, 2003).

Pintrich (2003), from the University of Michigan, performed a study on motivation specifically to the science classroom in 2003. His research focused on three

general themes: importance of a general scientific approach for research on student motivation, the utility of multidisciplinary perspectives, and the importance of use-inspired basic research on motivation. His study was based primarily out of his own classroom of 9th grade students, but also included observations of 10 other teachers in the science field.

In his study, Pintrich found that when students were able to make a connection between his curriculum and its real life application, students learned and retained much more of the information. He found that many students lost interest in a course that was intensive on any one of the above mentioned focus points, but when the three areas were balanced throughout the curriculum and introduced in a series of steps so that the students were not overwhelmed with direction and instruction, student behaviors fell in line with classroom expectations and student motivation was at an all time high. He found that not only did students perform well in his class but many of them were conducting research projects outside of the classroom and bringing them to him for approval. He felt that teaching the students the value of research and application outweighed the content because the students found intrinsic motivators to teach themselves and others about content in order to properly perform and present their findings (Pintrich, 2003).

Motivation in Multicultural Classrooms

Ukpokodu (2003) dealt with teaching preservice teachers about diversity and multiculturalism in the classroom. Her article was based on 30 years of classroom experience in a low income, urban district. During her last 10 years of service she provided mentor relationships with new teachers teaching them how to handle diversity before she went on to become part of the division of curriculum and instructional

leadership at the University of Missouri-Kansas City. Ukpokodu reports that many of the pre-service teachers come in with deep-seated preconceived notions about students of color and those from low income backgrounds. Many expressed blatant lack of inclination to work with culturally different students and indicate their desire to work in suburban and rural settings. Many of these preconceptions come from ignorance to the social reality of the world. It is these teachers that get their first jobs in an urban setting and either do not make it through the school year, or if they do, they do a poor job at being an educator, and this is not fair to the students. Teachers that go in with these unacceptable attitudes towards students in these settings do nothing more than set the children up for failure before the school year has even begun. Arrogance of a teacher often shines through causing students to lose motivation and act out, usually aggressively, making it a miserable year for all involved. Pre-service teachers that take a diversity elective as part of certification and degree programs bring in a more open perspective to this type of educational setting and this in turn benefits not only the teacher but the students as well. Ukpokodu (2003) recorded data of her mentoring relationships with students and noted that an outstanding 85% of teachers that did not take a diversity course did not make it through their first years in the urban district. However, 100% of those that did take such a course stuck it out through at least one year, and 68% stayed long enough to reach tenure in the district. One student returned to Ukpokodu after taking her course and reported to her that,

What I have learned in this class, I will carry with me forever. I can't say that about many classes but this class has been positive and an eye-opening experience for me. Because of this class, I now

understand about social and educational inequities and injustices. I had no idea of these because I have never really had to deal with any of these discriminations, so to speak. I feel that I have had it pretty easy in dealing with society so far but I am now aware of what others may go through because of the differences they may have (Ukpokodu, 2003, p.20).

There are many strategies that have been backed up through research to help improve student motivation and in turn influence good student behavior. Dr. Carol

Dweck, a professor of psychology at Columbia University, reported that,

Students that are mastery-oriented think about learning, not about proving how smart they are. When they experience a setback, they focus on effort and strategies instead of worrying that they are incompetent. This leads directly to what teachers can do to help students become more master-oriented: Teachers should focus on students' efforts and not on their abilities. When students succeed, teachers should praise their efforts or their strategies, not their intelligence...When students fail, teachers should also give feedback about effort or strategies—what the student did wrong and what he or she could do now (Education World, 2000, p.1).

In a study done by McMillan and Forsyth (1991), they report that students learn best when incentives for learning in a classroom satisfy their own motives for enrolling in the course. Some of the needs that students bring to the classroom are the need to learn something in order to complete a task or activity, the need to seek new experiences, the

need to perfect skills, the need to overcome challenges, the need to become competent, the need to succeed and do well, the need to feel involved and to interact with other people. These needs can be addressed by designing assignments, in class activities, and discussion questions to address these kinds of needs.

The second general strategy is to make students active participants in learning. Students learn by doing, writing, designing, creating, and solving. Passivity dampens students' motivation and curiosity. Pose questions. Don't tell students something when you can ask them. Encourage students to suggest approaches to a problem or to guess the results of an experiment (Lucas, 1990).

A third general strategy is to ask students to analyze what makes their classes more or less "motivating". Student input is always beneficial to instruction as they are the ones that have the best perception of what makes them want to learn. Sass (1989) asks his classes every year to recall courses in which they were highly motivated and those which provided them with little to no motivation. Each student makes a list of specific aspects of the two classes that influenced his or her level of motivation, and students then meet in small groups to reach consensus on characteristics that contribute to high and low motivation. Over the course of several years, Sass reports that he found the same eight characteristics emerge as the major contributors to student motivation: instructor's enthusiasm, relevance of material, organization of the course, appropriate difficulty level of the material, active involvement of students, variety, rapport between teacher and students, and use of appropriate, concrete, and understandable examples (Sass, 1989).

A fourth general strategy is holding high but realistic expectations for your students. Teacher expectations of students have a powerful effect on a student

performance. If you act as though you expect your students to be motivated, well behaved, hardworking, and interested in the course, they are more likely to step up to the expectations you have set. Set realistic expectations for students when you make assignments, give presentations, conduct discussions and grade examinations. To develop the drive to achieve, students need to believe that achievement is possible, which means that you need to provide early opportunities for success (American Psychological Association, 1992; Bligh, 1971; Forsyth & McMillan, 1991; Lowman, 1984).

Helping students set achievable goals for themselves is a fifth general strategy to employ. Failure to attain unrealistic goals can disappoint and frustrate students, dragging down motivation and increasing the risk of behavioral problems. Encourage students to focus on their continued improvement, not just on their grade on any one test or assignment. Help students evaluate their progress by encouraging them to critique their own work, analyze their strengths, and work on their weaknesses (Cashin, 1979).

A sixth strategy is to tell students up front what they need to do in order to succeed in your course. Make sure to put your comments in a positive context; instead of saying “You are way behind in your work,” you might say: “Here is one way you can go about learning the material that you missed. How can I help you?” (Tiberius, 1990, p.1). Avoiding creating intense competition among students is a seventh strategy. Competition produces anxiety, which can interfere with learning. Reduce students’ tendencies to compare themselves to one another. Refrain from public criticisms and from comments or activities that pit students against each other (Eble, 1988).

An eighth strategy talks about emphasis on mastery learning over grades. A study conducted by Ames and Ames (1990) took two different approaches to homework. One

teacher collected and graded all homework and made it worth 20% of their grade. The second teacher gave students a fixed amount of time to work on an assignment (say 30 minutes a night) and to come back to class with any questions about problems they could not complete. They were graded as satisfactory or unsatisfactory and the students were given the opportunity to redo assignments. Homework counted for only 10% in this class but students in this class were taught that making mistakes was acceptable and part of the learning process whereas students in the first class would rather give up or not do the assignment rather than risk a low grade.

How do peers impact student motivation?

Huften, Elliot, and Illushin (2003) identified similarities and differences between cultures and compared them to student motivation. Their research was based primarily on surveys as well as a few student interviews of 250 schools of every cultural and socioeconomic standing. Similarities that they found between cultures is that 85% of the students agreed that they worked better when paired with another student. Fifteen percent reported that they performed best when they felt there was healthy competition with someone else in the class that drove them to better themselves. Less than 10% of students reported that they felt encouragement to succeed from friends.

The differences reported in this article were less obvious. An astonishing 95% of African American students and 80% of Latino students reported that they performed better when expected to work in groups to develop projects and to complete assignments. After these reports were documented, Huften et al. (2003) decided that they should look into student performance with relation to such a report. After contacting teachers from the participating schools, they found that African Americans and Latinos saw a dramatic

increase in grades and test performance as well as exhibiting mastery learning standings at an individual level when allowed to complete assignments in a group of two or more, a 20% average increase in grades. There was no significant change in grades when Caucasian students were paired or worked individually (Hufton, Elliot, & Illushin, 2003). Reports of this study related closely to a study performed by Cantwell and Andrews (1999). While studying cognitive and psychological factors underlying secondary school students' feelings towards group work, they inadvertently found the same information reported by Hufton et al. (2003) about student achievement and motivation (Cantwell & Andrews, 1999).

Bouffard and Couture (2004) also performed a study that was designed to look at academic achievement among students enrolled in different schooling tracks. This study turned out to become a cultural difference more so than a fair statement on schooling tracks. Their study focused on how students achieved if they were placed in training courses or if they were placed in college bound programs. They interviewed 500 students between the ages of 16 and 20 of which they looked at background information in order to choose their study participants. What they found was very interesting. Caucasian students that were placed in career tracks or in college bound programs overall had a 98% success rate after high school. Seventy five percent of students reported that if they were in a college bound program, they went to college and earned a degree or were well on their way to earning one. Caucasian students that were placed in career tracks reported that 62% of them stuck with the career they had trained for and 50% reported that they were completely satisfied with their jobs. However, when the study started looking at African American students, the results were shocking. Less than 35% of African

American students that were placed in college bound programs actually went on to college and less than 10% of them graduated with a degree. Just below 95% of these students placed in the college bound program reported that they did not feel prepared for college or ended up taking some remedial courses to get them on par with the other students in their classes. However, African Americans that were placed in job tracking programs reported an 87% success rate of finding jobs in their trained field and earning good money. Ten of the other 13% reported that they received additional job training and advanced or they changed careers (Bouffard & Couture, 2004).

Phlet, Andriessen, and Lens (2000) did further studies into setting goals for the multicultural classroom. Discipline problems are the leading cause of classroom management issues. They tested a variety of students from every culture. Their findings indicate that setting goals and placing students in line of sight with the classroom for students that are struggling to stay on task really help these students to evaluate their performances as they go. However, when the reminder was removed from the wall, many students went back to unsafe and unruly classroom behaviors. Eighty percent of African American students returned to the behaviors within a week and if they were asked what their future goals were, they would tell you they re going to join the NBA and become the next Michael Jordan. Less than 10% could recall the classroom goals that had been posted a week prior to the interview. The Caucasian students on the other hand did not forget these goals as readily as the African American population, taking over a month for these students to revert to the chaos that began the year. Less than 10% could recite back with an 8% turnaround rate of these same students (Phalet, Andriessen, & Lens, 2000). However, student performance in the classroom did not significantly increase for

Caucasian students who set future goals. African American students did increase their participation, motivation, and test scores when there was that constant reminder of what needed to be done by when (Phalet et al., 2000).

Kauffman and Husman (2004) looked at performance and motivation when a teacher is constantly reminding students of daily due dates. This study found that when teachers left directions on the overhead for the length of the project with specific time indicators, the projects were done more thoroughly, were of higher quality and were done within the given time frames. The study found sixty- seven percent of African American students scored higher and were able to keep themselves on task when the assignment was broken down into smaller chunks. Instead of saying here is a 40 minutes class period to complete this in the lessons were broken down into 10 minute increments: By the end of the first 10 minutes, you should have the following done (Kauffman & Husman, 2004).

How does administration affect student motivation?

Bligh (1971) noted in his numerous studies that administration did not directly have an impact on student motivation in the classroom, but affected the classroom indirectly. If there had been disagreement between an administrator and a teacher where the teacher showed signs of discontent, the effects on the delivery and the attitude of the teacher changed and therefore impacted student motivation. Administrators that were supportive of their teachers were well liked by students and a word from an administrator to keep up the good work was enough to get a student to be involved with lessons all day. He also noted that students became very protective of their teachers, and if they heard a bad word about a teacher they liked from an administrator, the students' motivation could

be affected one of two ways. The student will build up animosity towards the administrator because they enjoy class and their teacher or they will start to doubt their teacher because the administrator, a person of authority, says that they are not very good. In either case, the students' desire to be in class and working has been affected. They will work hard to make their teacher look good or they will give up thinking that it's not worthwhile.

Lowman (1990) took a look at teacher administrator relationship. Upon observation and conversations with students and teachers alike, he found that 85% of teachers that had had public run-ins with an administrator experienced horrible things with classroom behavior and motivation within several weeks to follow. Ironically, students said that if the teacher was getting yelled at in front of them by someone else of authority that has a higher position, they feel that they do not owe any responsibility to the teacher because she is easily overridden by this administrator and she has been set straight. Teachers noted that any kind of run-in with an administrator, public or not, was enough to cause issues in proper delivery of a lesson and in turn students' motivation and behavior.

It can be concluded that most student behaviors and motivation are affected by the community and tone the teacher sets within the classroom. It is our responsibility as educators to find ways to improve motivation and the classroom environment however, it is crucial that each teacher find appropriate strategies that work for their particular class of students.

Chapter 3: Applications and Evaluations

Introduction

Following the extensive literature review on the subject of student motivation with regards to classroom behaviors, I developed several methods to put into place in order evaluate how student motivation was effected by teacher, peers, and administration. I developed a series of surveys, continued with the video taping and daily reflection journals, assessed and modified my lesson plans, and developed motivational strategies to implement within the classroom.

Participants

This was a study based on 4 sections of 7th graders that ranged from 11-15 years of age, totaling 104 students. One section was a 7th grade honors class which had students of varying abilities; some which should not have been placed in an honors class and some that would have benefited from skipping a grade or two. Two sections were 7th grade general education students, again having differing abilities that spanned from those who would have benefited from the honors program to those who could barely speak English and struggled all year with the curriculum. The last section was an inclusion group that consisted of several students that suffered from emotional and behavioral problems, two deaf students, four students that struggled with reading and writing. The remainder of this class was as diverse as the other classes I taught, including three students that should have been placed in the honors program. Each class had at least two students that had special needs in reading and required extra time and assistance on tests that included questions being read to them and in some cases a recorder for their responses. Three of

the four classes had an equal distribution of girls to boys, with the exception of my most challenging class which had 22 boys and 6 girls. All classes were 92% African American, 3% Hispanic, and 5% Caucasian, which is the base diversity of the school as well.

Procedures of Study

I broke the study down into four phases in order to complete my research. Phase one was reflection on my responsibilities in the classroom, where I completed reflection journals and videotaped lessons for reflection at home. Phase two was implementation of new strategies based on the reflections, such as the candy review and the science fair. Phase three was student feedback on the implementation and how these changes effected their motivation and desire to learn through the use of several surveys. Phase four was the development of an action plan so that the results from this research could be applied in years to come.

Candy Review Sessions

I implemented this motivation technique during the review for the midterm exam. I was not expecting nor could I measure the outcome on the midterm for this technique, but the implementation was done then so that the students got used to these sessions. It was a very simple instrument. The day before a test, the students would get a half hour review session of which I would ask them material from the unit. They received one piece of candy if they raised their hand but answered incorrectly. They received two pieces if they raised their hand and answered correctly. They lost a piece if they shouted out an answer, whether it was right or wrong. The student that had the most pieces of candy at the end of the session received a candy bar of their choice. The basic idea for this was to encourage student participation so they would pay closer attention to what

was going on in the room and encourage them to take risks. If they answered wrong but followed the procedure of the game, they were still rewarded and the likelihood that they would listen for the correct answer would increase. I also repeated questions throughout the session, again increasing the likelihood of student's paying attention.

In addition to the student surveys and reflection sheets, I kept daily journals on every class that I taught. I would fill these out directly after each class and supplement these by watching the video tapes of the lessons to catch things that I might have missed while I was instructing or dealing with behavior issues.

I separated my reflection journals into three different categories: lesson plans, classroom management, and student motivation (see Appendix 7). Since I do my lesson planning two weeks at a time, doing these reflection journals enabled me to take the lessons that I had already planned and adjust them according to the information that I gathered each day (see Appendix 8).

Science Fair

As part of my study, I designed a very comprehensive science fair project, based on the energy unit, called Energy Afternoon (see Appendix 9). It was composed of three tasks that students were expected to complete in teams of 4-6. Each task was designed to challenge students in one or more of three focus areas: scientific method, engineering and experimental design, and methods of data collection and reporting. Students were given two weeks of class time to complete these projects. They were instructed prior to the assignment that I was going to act merely as a facilitator; I would help to clarify directions, help with student conflicts, and circulate around the room to make sure everyone was on task. I would not help with the design of their experiments, explain

concepts that had been gone over in class numerous times, or give them hints on what they needed to be doing as far as each task was concerned. I wanted to see what kind of motivation these students had acquired after 9 months of practicing each of these parts individually. I was interested in their ability to bring together what they had learned in order to develop something new. Within the parameters of this experiment, I tried a variety of motivational techniques and concluded this part of the study with student interviews and a survey for the judges to complete with regards to student achievement (see Appendix 10).

The techniques that I used for this part of the study were as follows: I introduced the study by going through the directions and expectations of the project, gave the students a copy of the rubric and gave them a checklist that the judges would be using to grade their tasks. During class time I used extrinsic motivators (fancy pencils) to reward the students that were staying on task. At the one week mark, I performed a bottle rocket demonstration in which students collected data based on the varied amounts of water inside the rockets, using student volunteers to help with the demonstration. I also used extrinsic motivators for an end prize as this was a science fair. They received awards based on the criteria set forth for the judges (movie passes and a certificate) so they were able to set goals for themselves, turning those extrinsic motivators into intrinsic ones.

After I decided the steps that I was going to take in the research, I had to develop a timeline in which everything would occur. I decided that the best way would be to make the changes and then evaluate the effects of the changes within short amounts of time, usually within a three to four week period of making the change. This decision was based on the low retention level of the students, so if the focus was kept on short time

spans they would respond with more meaningful feedback and work their way up to recalling information over longer periods of time. After the timelines were in place, I developed the instruments I would use in my study.

Instruments for Study

I designed my instruments in order to incorporate the data I had been collecting throughout the year. This data was used to design additional methods to supplement and focus changes which I had already made. My instruments included several different surveys that the students completed periodically; daily reflection sheets for the students, implementation of the “Candy Review”, video taping lessons, keeping my own daily reflection journals, and alteration of lessons based on the video tapes and reflections of me and of the students. I also included a very comprehensive science fair centered on their energy unit for students to partake in. The Energy Afternoon consisted of three very detailed inquiry based student-centered tasks that focused on scientific method, engineering and experimental design, and data collection and recording strategies. This science fair was concluded with student interviews and a student evaluation survey filled out by our judges.

In order to design a classroom that is more student-centered than teacher-centered, I had students complete surveys periodically. At the beginning of the year the survey was merely a tool to find out what interested the students in the area of science and to find out some information about each student (see Appendix 1). I reviewed each form so I could incorporate the areas of science that came up most frequently and to include hobbies and special interests of the students that would engage them in the subject matter.

The second survey was conducted in early November, following my first formal observation by my administrator. This was designed to gather information from the students in a couple of different areas that I wanted to focus on to improve student performance. It included questions about what motivates students to learn and how their teacher, classmates, and administrators either helped or hindered their learning (see Appendix 2).

Also in early November, a self assessment/class reflection sheet, completed on a daily basis, was added. This was designed to help the students identify their areas of strength and where they needed improvements. It focused on classroom behavior and completion of class work and served as a way to intrinsically motivate and help the students make the correlation between poor grades, behavior, and completion of work (see Appendix 3).

Student grades were split into 4 categories, each worth 25% of their grade and allowed students to track their grades. These categories were class preparation, behavior, work (which included tests and quizzes), and participation. Each day they received a grade for each area which they could average together to compute their grade. It also indirectly helped students with organization since students are instructed to place these reflection sheets in their notebook with the materials that were covered on that day. These assessment/reflection sheets were made to help guide the students on what it was that they needed to concentrate on when they were in class. They received a grade based on each of the categories. On the bottom of the weekly progress report, I would identify one goal to be worked towards during the following week.

At the completion of the first semester, I again had the students complete surveys. These surveys were more centered on motivation to learn and what would better motivate them as opposed to the surveys from November that were designed to cover more aspects of the classroom (see Appendix 4). These were 4-point Likert scale surveys which took questions that they answered previously in writing and asked if they felt any differently about their motivation now as opposed to in September or in November. It was split into the same four categories: strongly disagree/disagree and agree/strongly agree. There was also a space where they could make comments to address any concerns they had about their performance, the content and/or how it was being presented.

The May survey took the form of the same 4-point Likert scale and focused on their motivation since January. It took the questions found on the January survey and asked students to rate their motivational level and explain why they felt they were more or less motivated in May compared to January (see Appendix 5).

The final survey was handed out to the students in June to track how they felt overall about the school year. This was a close facsimile of the survey they took in November, which was much more writing intensive and provided much more information than just the Likert scale surveys (see Appendix 6). This survey focused solely on motivation and concentrated on things that were done throughout the year that made them want to learn and things that held them back from performing to the best of their abilities. It also has a section that allowed them to provide suggestions for how to structure the class next year to help the incoming 7th grade students, as well as providing instructional assistance to all 7th grade teachers.

Chapter 4: Results

This study yielded a lot of data, mostly in the form of student feedback to classroom activities but included observational feedback from myself and from my peers. In order to evaluate all of this data, I broke it down based on when the student survey was taken and identified questions that were similar in nature and grouped them according 4 specific categories: student attitudes towards science, student motivation, student behavior, and student input. I further subdivided student motivation into four categories: teacher generated, student generated, peer generated, and administrative generated. I then compared my observations and those made by my peers to the student input to draw a conclusion about student motivation in my classroom.

Results from beginning of the year survey

The question that the students answered in September was a base for me on how to design their lessons. Out of the 104, seventh grade science students that I teach, 95 of them said that they enjoyed the experiments and hands on activities. Three of them expressed interest in space science (of which is not in our curriculum) and the remaining six said that they hated science and had no interest in any science topic. Since 92% of the students expressed interest in experiments and hands on activities, I started out early with student centered group projects and hands on activities. Observational results from this were as follows: not enough time was spent on developing basic skills such as following directions, voice level management, on task behavior in a group, and delegating out work. Many of the students expressed when working on these kinds of activities that the directions were too lengthy and they did not always understand what they needed to be doing. Many students did report that they were not paying attention when directions were

given, and even when the directions were given orally and in writing, they failed to understand expectations of the assignment.

Results of Late November Survey

These results are reported directly after receiving my first formal observation from the administrator. I wanted to find ways to better serve the students' needs in my classroom and pinpoint areas that needed the most focus. I broke down the questions into categories: student attitudes towards science, student motivation, student behavior, and student input.

Student attitudes towards science questions were identified as classroom content questions one and two and analysis questions two and four. Sixty-two percent of the students reported that they found the content interesting, with 22% of them saying that they really enjoyed what they were learning. Twenty-three percent said that they liked what they were learning but didn't see why it was important. The remaining 15% said they had no interest in learning and found it boring. Eighty-eight percent of the students reported that they enjoyed the way that the content was presented, including 62% of the students that said they had no interest in the subject. The things that they enjoyed the most were the hands on activities that were with each topic (92%). Ninety-eight percent of the students like the group work and felt they were learning better with a partner (only 10% enjoyed working in groups of 3 or more), and 92% of the students enjoyed the "real" movies that I used for each topic. Ninety-percent of the students said that they find that notes do not help them to learn and they were boring, but 95% of the students reported when the lesson was designed where there was a short reading on the topic that

we read out loud as a class and then did an activity either alone or as a group, they understood the materials much better.

Student motivation was broken down into four categories: teacher generated motivation, student generated motivation, peer generated motivation, and administration generated motivation. The teacher generated questions were identified as: a) classroom content questions three, four, and eight b) classroom environment questions two, three, four, and six c) yes or no questions seven and ten d) always sometimes, never questions three and four and e) analysis questions two, five, six, and ten. One-hundred percent of the students felt that I was knowledgeable in the content area: they all felt that I gave them a better understanding to questions they asked and I was always able to answer questions (with a few of the kids saying that I always gave them more information than I needed to). One-hundred percent of the students felt like I was prepared to teach them the content and enjoyed the lesson format, but 68% reported that they did not feel I was ready to put up with students when I was teaching and overreacted to some behaviors. Sixty-five percent of the students reported that the popsicle sticks that I drew randomly kept them paying attention in class because they did not want to be embarrassed if caught off-guard (98% of my honors students gave this as a reason). Ninety-eight percent of the students said that passing out candy for correct responses keeps them paying attention and motivated to participate and do well in class (and that they preferred the Jolly Ranchers to the Hershey Kisses). Ninety-four percent reported that I was fair in treatment of students. Five percent said that they did not like the responses I gave when they were wrong when answering a question. Ten percent reported they felt lost in class because the content was difficult. Thirty-seven percent reported that they felt like they learned a great

deal of information in science, 48% felt like they learned some, and 15% reported they learned nothing. Ninety-six percent felt that I could help them clarify directions and expectations. One-hundred percent felt that I encouraged them and wanted them to do well in class. Ninety-five percent of them said I should continue to pass out candy for class participation, with 98% of the students saying that when they participated in the review sessions when candy was passed out they were able to pass their test (or at least do better than if they were not to participate). Seventy-three percent of the students said that my expectations of them were too high with 10% reporting that the high expectations were helping to challenge them and help them learn.

The student generated motivation questions were broken down as follows: a) classroom content questions five, six, and seven, b) classroom environment question three, yes or no questions one, two, and nine c) always, sometimes, never question three, and d) analysis questions three and thirteen. Ninety-eight percent of the students reported that they worked best with a partner but only 14% of the students felt they worked better when paired up with 3 or 4 people. Eighty-seven percent of the students struggled when they were expected to read and answer questions on a topic or to complete an activity without a partner. Sixty-five percent felt that writing essays was an area of weakness for them and 53% reported that they would do better on a test if it was short answer instead of multiple choice (they said they would get confused with the choices and would do better if they could just explain the answer rather than picking one). Eighteen percent of the students felt that they had intrinsic motivation. Ninety-eight percent of the students reported to be extrinsically motivated. Thirty-one percent of the students felt that over time they started to become intrinsically motivated and they wanted to participate

whether I was handing out candy or not. Three percent of the students reported have no motivation whatsoever, stating that they will pass the year regardless because they always have. Twenty-one percent of the students reported studying for tests.

Peer generated motivation questions were as follows: a) yes or no questions four and five and b) analysis question seven. Eighty-three percent of the students reported that their friends do not encourage them to do well; in fact they said that their friends try to encourage them to do poorly. Sixty-nine percent of the students said that the behavior of their classmates kept them from learning to the best of their abilities. Ninety-eight percent of them reported that they worked better when they were with a partner, but only 10% liked working in groups of 3 or more.

Administration generated motivation question was noted as analysis question fourteen. Ninety-seven percent of the students felt that the administration did not encourage them to succeed. Eighty-seven percent of the students did not like the no book bag policy and felt that this kept them from coming to class prepared because they couldn't carry what they needed to class. Eighty-three percent of them said they felt that (my administrator) spoke very harshly to them and did not encourage them in the classroom and did not care how they did in class with 64% of them saying that they did very poorly in classes after speaking with (my administrator) for that day.

Student behavior questions were broken down as follows: a) classroom environment questions one, b) yes or no question six, c) always, sometimes, never questions one, two, and five, and d) analysis questions one, eleven, and twelve. Eighty-eight percent of the students reported they felt safe in my classroom, 9% reported that they didn't know, and 3% of them reported that they did not feel safe because of the

behavior of (three students' names appeared here extremely often). To break this down a little further, two of my classes (my inclusion and my honors class), 100% of them felt safe in class. One student from my Monday/Thursday group reported they felt unsafe because of a specific student and three of them in my Tuesday/Friday class felt unsafe in the room because of two specific students. Of these three people that reported feeling unsafe, they added comments that they felt the teacher would be injured and unable to control these three particular students if they lost control in class. One-hundred percent of the students my Tuesday/Friday group reported that the removal of one particular student into GTI (Group Tutoring Instruction) improved the classroom, both with regards to academics and safety. Zero percent of students reported going home and thinking about their classroom behavior on any given day.

Student input was found in analysis questions eight, nine, and ten. There were several student comments made that were standard. Many felt I should continue the no homework policy and continue playing music that the students put together during work times (there were complaints that I found edited versions of the songs they requested). Most students felt that I needed to be more strict with students that are disobeying rule: most said to get rid of warnings, give one detention kick them out of class and if it persists the kid should be suspended and if it happens more than 10 times in a year they should be long-termed. Students like the readings followed by the activities and the class discussions in place of taking notes. Many said they needed help with organization and test taking skills and asked if there were activities that would help them with these skills. All students agreed that I should keep giving out candy and keep being nice. Several students commented that I needed to be in one place after school its hard to find me when

they stay after for help since I was all over the building. One-hundred percent of the students wanted to be taught in a science lab room or at least in a room that looked like a science room. Some commented that I should keep the marble jar and the stickers.

Results from Self Assessment Sheets and the "Candy Review"

It took close to two months before students started realizing that their grade in class was often correlated with their behavior, preparedness, and/or participation. Sixty-five percent of the students reported that they followed the goals that I put on the bottom of the progress report and that they saw their grade increase when they were concentrating on that goal. Out of this 65%, 95% of the students reported that after one month of working towards that goal they started automatically focusing on their next set goal. Seventy three percent reported that after three months of these goals, they could start setting goals for themselves.

For the 65% of the students that took these self assessment sheets seriously, their grades started to steadily increase. The first marking period that these assessment sheets were in affect for the entire marking period (this would be our 3 marking period for the school), I had a 40% failure rate compared to the 62% failure rate for the first marking period and a 58% failure rate in the second marking period. By the end of the fifth marking period, my failure rate had dropped to 25%.

The implementation of the candy review day has shown drastic improvements in student performance on tests. I started doing this at the end of the third marking period, with the midterm review. Since it was still a new strategy, I was unable to make a decision about student performance on the midterm. Overall, my honors students did phenomenally on the midterm (only 2 failed and the average score on the midterm was

81%), but my general education students did not do as well; there was a 47% failure rate. I cannot attribute the 53% passing to the candy review as I am not sure how these students would have done without it. However, once this candy review was implemented, it seemed to decrease test anxiety. When a test was announced the students would get excited and ask when we were having the review session. My class participation grades went from a class average of 60% to a class average of 80% and there was a drastic improvement in test grades.

Table 1

Class Average of Test Scores for each Class, Prior to Candy Review Sessions

Test	Class 1	Class 2	Class 3	Class 4
Scientific method/ graphing	62%	23%	39%	59%
Animal Diversity	N/A	72%	79%	82%
Atomic Structure	79%	N/A	N/A	N/A
Skeletomuscular	N/A	35%	41%	58%
Digestive	N/A	41%	51%	54%
Cardiovascular	N/A	38%	49%	62%
Excretory	N/A	56%	63%	71%
Reproduction	N/A	46%	39%	62%
Periodic table	69%	N/A	N/A	N/A
Bonding	54%	N/A	N/A	N/A
States of matter	75%	N/A	N/A	N/A
Density	84%	N/A	N/A	N/A

Table 2

Class Average of Test Scores for each Class, After Candy Review Sessions

Test	Class 1	Class 2	Class 3	Class 4
Midterms	78%	37%	41%	57%
Layers of the atmosphere	61%	N/A	N/A	N/A
Layers of the Earth	N/A	61%	82%	80%
Rocks and Minerals	N/A	35%	58%	64%
Earth Processes and theories	N/A	51%	83%	85%
Energy	90%	78%	85%	89%
Cells	72%	57%	61%	61%
Simple Machines and Work	N/A	53%	71%	74%
Genetics and Evolution	88%	N/A	N/A	N/A
Heating and cooling	N/A	77%	81%	82%
Law of Conservation of Energy	N/A	68%	79%	85%
Ecology	92%	N/A	N/A	N/A
Final Exam	75%	66%	71%	72%

Table 3

Class Test Averages Before and After Candy Review

Class #	Average Before Candy Review	Average After Candy Review	Standard Deviation
1	70.5	75.3	2.3
2	44.4	53.1	4.3
3	51.5	68.4	8.3
4	64.0	72.0	4.0

Based on the standard that any number greater than 1 shows a significant difference between any two data points, it is clear that there was a significant increase in grades following implementation of the candy review, with the highest significant difference showing in class 3 with an 8.3 standard deviation. When the midterm grades were removed, the standard deviation increased even more from the first set of averaged data.

When students were interviewed, many of them stated that the candy review removed the test anxiety, a conclusion that I had drawn based on observation and student reactions, and they looked forward to a test because it meant that there would be a review session. Sixty-eight percent of the interviewed students (50 students were interviewed for this part of the study from various classes chosen because all of these students gave responses to the first survey that they did not study for a test) reported that they would go home and study prior to the review sessions because they wanted to be the one that received the most candy at the end of the review session for a couple of reasons. First it

made them feel good about themselves that they knew the answers. Second, it meant they got the big candy bar prize at the end. Third, they reported that they felt more confident that they would do well going into the exam.

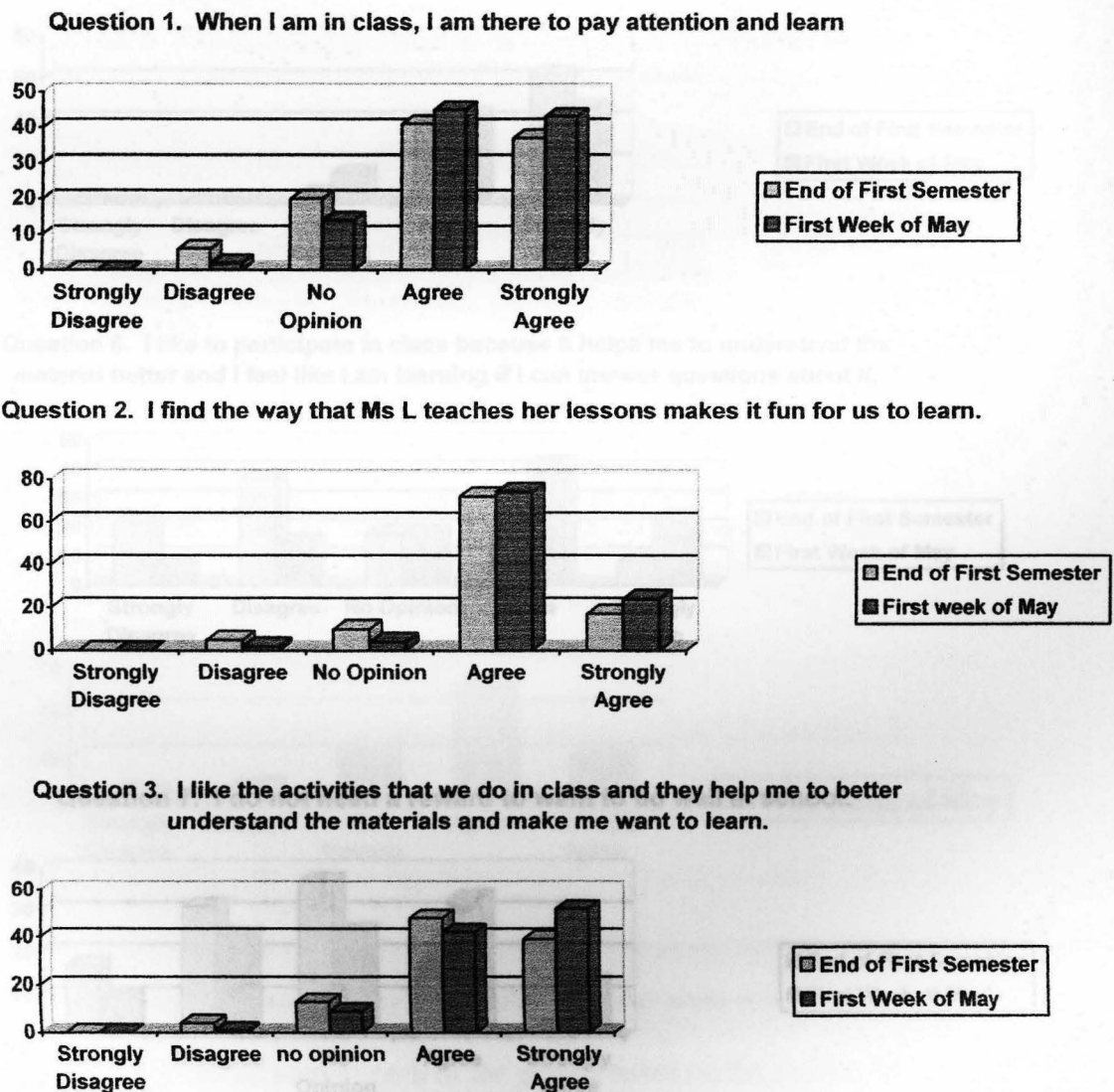
Regardless of the fact that my administrator frowned on these review sessions, because “Students are being rewarded for things that the district expects them to do on their own,” I feel that they have been a great benefit to the students. The candy review has taught the students the difference that studying makes, has made them more conscious of keeping an organized notebook to study from, has shown them that class participation increases their ability to internalize information, and has made for a very enjoyable and rewarding class every 3 weeks before the tests were given. Observations made by me during the testing period revealed that more students were at the bare minimum attempting to take the test. Prior to these review sessions I would have at least one student from each class, and sometimes as many as 7 students, refusing to take the test because they knew that they would fail and therefore be a waste of time. The fact that every student was attempting the test led to better classroom behavior; I no longer had to take points away or send kids from the room when testing was going on. In fact I had classes that were so silent during tests that you could hear a pin drop.

Four Point Likert Scale Survey Results

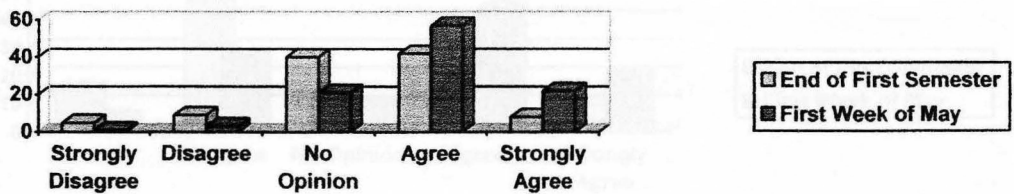
Following the midterm exams, the students received the first of two, 4-point Likert scale surveys to fill out. A second 4-point Likert scale survey was taken in the first week of May, containing many of the same questions, and a few that helped the students and me to set new goals. The purpose of these surveys was to see how students felt in regards to student attitude, motivation, or instructional practice/planning from November

to May. Results of these surveys can be seen in Figure 1. Questions that remained the same for both studies are graphed together to see the relationships. Questions that were similar in nature but asking a separate question were graphed together. Data obtained from the first survey administered at the end of the first semester is in blue, while from the first week of May survey appears in maroon.

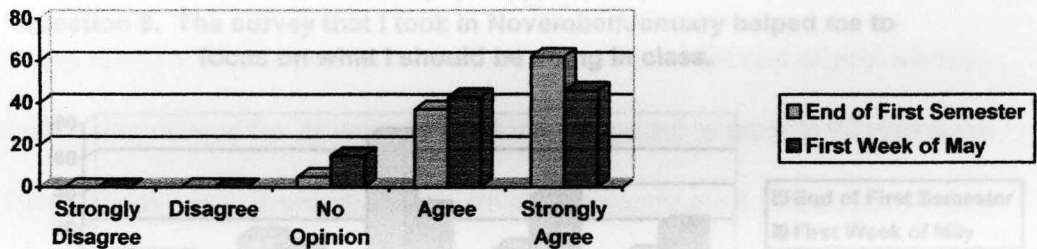
Figure 1. Results to Individual Questions of the 4-point Likert Scale Survey



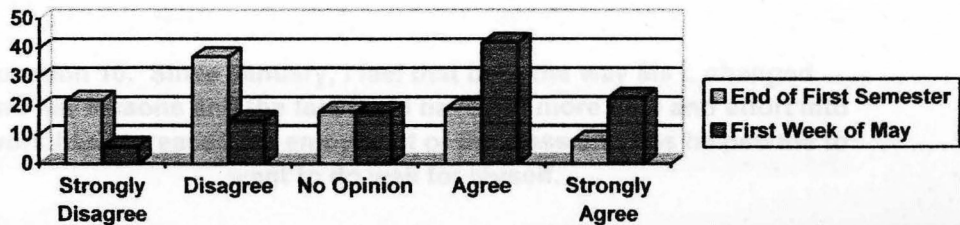
Question 4. I feel that Ms. L used the information from the survey we took in November/January and put it to work in our classroom so that I am motivated and want to come to class to learn.



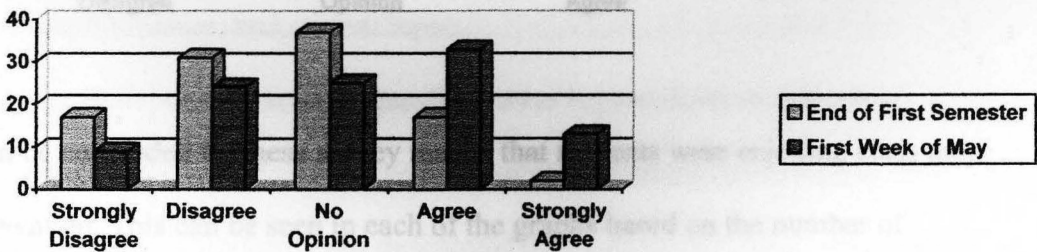
Question 5. I am more likely to participate if Ms L gives out candy.



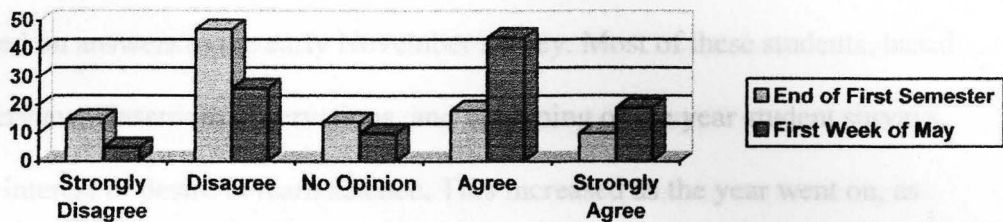
Question 6. I like to participate in class because it helps me to understand the material better and I feel like I am learning if I can answer questions about it.



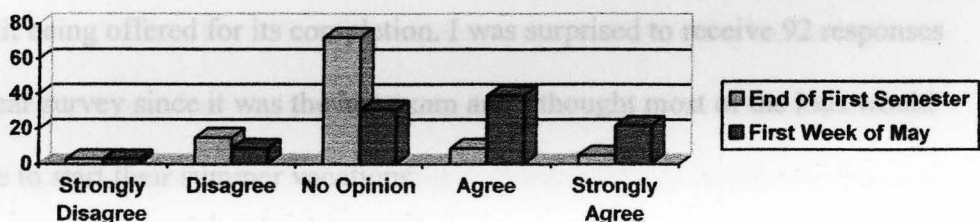
Question 7. I do not need a reward to want to do well in school.



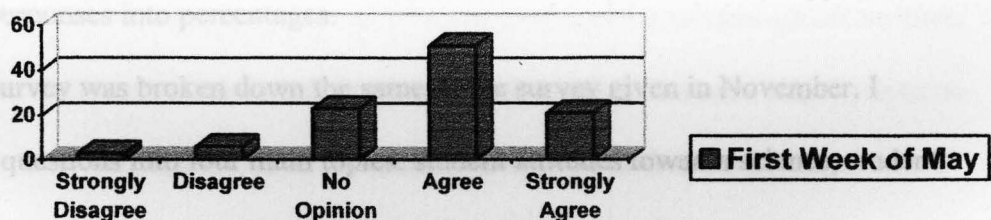
Question 8. I feel that I have made an effort to improve my grades and my participation in class because I want to.



Question 9. The survey that I took in November/January helped me to focus on what I should be doing in class.



Question 10. Since January, I feel that both the way Ms L changed around her lessons and the fact that I have put more time and effort into my work has increased my enjoyment of the class and has helped me to want to do well for myself.



It can be concluded by these survey results that students were enjoying class more as the year went on. This can be seen in each of the graphs based on the number of students that responded to each question and the shift from strongly disagree/disagree to agree/ strongly agree from January to May respectively. There may be other factors

involved. Students may be enjoying the content more now than the content in November or January, or the activities may have become more interesting. This change however is negligible based on answers to the early November survey. Most of these students, based on student interview, classroom observations, and beginning of the year student surveys, had very little interest or desire to learn science. This increased as the year went on, as can be seen in the Likert scale results.

Results from the End of the Year Survey

Following their final exam, students were asked to fill out the end of year survey, with extra credit being offered for its completion. I was surprised to receive 92 responses to the end of year survey since it was the last exam and I thought most of the kids would finish and leave to start their summer vacations.

The end of year survey was not much different from the comprehensive survey given in November. It focused on the year as a whole as opposed to the first 3 months of the school year but contained a lot of the same questions. Again, I broke the questions down into categories, identifying which questions dealt with which category, and summarized responses into percentages.

This survey was broken down the same as the survey given in November. I separated the questions into four main topics: student attitudes towards science, student motivation, student behavior, and student input.

Student attitude towards science questions were broken down as follows: a) classroom content questions one and two and b) analysis questions two and four. Sixty-five percent of the students reported that they found the content interesting, with 38% of the 65% saying that they really enjoyed what they were learning, 28% said that they liked

what they were learning but didn't see why it was important and 8% said they had no interest in learning and found it boring. Ninety-two percent of the students reported that they enjoyed the way that the content was presented, including 57% of the students that said they had no interest in the subject. What students enjoyed the most were the hands on activities that were with each topic (96%). Ninety-six percent of the students like the group work and felt they were learning better with a partner (only 13% enjoyed working in groups of 3 or more), and 95% of the students enjoyed the "real" movies that I used for each topic. Ninety percent of the students said that they find that notes do not help them to learn and they were boring, but 95% of the students reported when the lesson was designed where there was a short reading on the topic that we read out loud as a class and then did an activity either alone or as a group, they understood the materials much better (these values did not change from the first survey).

Again, the student motivation section was broken down into four categories: a) teacher generated motivation, b) student generated motivation, c) peer generated motivation, and d) administration generated motivation. The questions for teacher generated motivation were broken down as follows: a) classroom content questions three, four, and eight, b) classroom environment questions two, three, four, and six, c) yes or no questions seven and ten, d) always, sometimes, never questions three and four, and e) analysis questions two, five, six, and ten. One-hundred percent of the students felt that I was knowledgeable in the content area; they all felt that I gave them a better understanding to questions they asked and I was always able to answer questions (with a few of the kids saying that I always gave them more information than I needed to). One-hundred percent of the students felt like I was prepared to teach them the content and

enjoyed the lesson format, but 60% reported that they did not feel I was ready to put up with students when I was teaching and overreacted to some behaviors. Sixty percent of the students reported that the popsicle sticks that I drew randomly kept them paying attention in class because they did not want to be embarrassed if caught off-guard (99% of my honors students gave this as a reason). One-hundred percent of the students said that passing out candy for correct responses keeps them paying attention and motivated to participate and do well in class (and that they preferred the Jolly Ranchers to the Hershey Kisses). Ninety-seven percent reported that I was fair in treatment of students. Four percent said that they did not like the responses I gave when they were wrong when answering a question. Eight percent reported they felt lost in class because the content was difficult. Fifty-three percent reported that they felt like they learned a great deal of information in science, 37% felt like they learned some, and 10% reported they learned nothing. Ninety-six percent felt that I could help them clarify directions and expectations. One-hundred percent felt that I encouraged them and wanted them to do well in class. One-hundred percent of them said I should continue to pass out candy for class participation, with 95% of the students saying that when they participated in the review sessions when candy was passed out they were able to pass their test (or at least do better than if they were not to participate). Seventy percent of the students said that my expectations of them were too high with 15% reporting that the high expectations were helping to challenge them and help them learn.

Student generated motivation questions were broken down as follows: a) classroom content questions five, six and seven, b) classroom environment question three, c) yes or no questions one, two, and nine, d) always, sometimes, never question

three, and e) analysis questions three and thirteen. Ninety-eight percent of the students reported that they worked best with a partner but only 15% of the students felt they worked better when paired up with 3 or 4 people. Eighty-one percent of the students struggled when they were expected to read and answer questions on a topic or to complete an activity without a partner. Sixty-one percent felt that writing essays was an area of weakness for them and 48% reported that they would do better on a test if it was short answer instead of multiple choice (they said they would get confused with the choices and would do better if they could just explain the answer rather than picking one). Thirty-five percent of the students felt that they had intrinsic motivation where 94% of the students reported to be extrinsically motivated. Forty-eight percent of the students felt that over time they started to become intrinsically motivated and they wanted to participate whether I was handing out candy or not. Three percent of the students reported have no motivation whatsoever, stating that they will pass the year regardless because they always have. Fifty-nine percent of the students reported studying for tests.

Peer generated motivation questions were broken down as follows: a) yes or now questions four and five and b) analysis questions seven. Seventy-five percent of the students reported that their friends do not encourage them to do well; in fact they said that their friends try to encourage them to do poorly. Sixty-nine percent of the students said that the behavior of their classmates kept them from learning to the best of their abilities. Ninety-eight percent of them reported that they worked better when they were with a partner, but only 15% liked working in groups of 3 or more.

Administration generation motivation again related to analysis question fourteen. Ninety-eight percent of the students felt that the administration did not encourage them to

succeed. Ninety-four percent of the students did not like the no book bag policy and felt that this kept them from coming to class prepared because they couldn't carry what they needed to class. Eighty-seven percent of them said they felt that (my administrator) spoke very harshly to them and did not encourage them in the classroom and did not care how they did in class with 67% of them saying that they did very poorly in classes after speaking with (my administrator) for that day.

Student behavior questions were broken down as follows: a) classroom environment question one, b) yes or no question six, c) always sometimes never questions one, two, and five, and d) analysis questions one, eleven, and twelve. Ninety-seven percent of the students reported they felt safe in my classroom, 2% reported that they didn't know, and 1% of them reported that they did not feel safe because of the behavior of (1 students' name appeared here extremely often, as the other 2 received long term suspension in January). To break this down a little further, 2 of my classes (my inclusion and my honors class), 100% of them felt safe in class. One students from my Monday/Thursday group reported they felt unsafe because of one specific student and 3 of them in my Tuesday/Friday class felt unsafe in the room because of 2 specific students. Of these three people that reported feeling unsafe, they added comments that they felt the teacher would be injured and unable to control these 3 particular students if they lost control in class. One-hundred percent of the students my Tuesday/Friday group reported that the removal of one particular student into GTI improved the classroom, both with regards to academics and safety. Zero percent of students reported going home and thinking about their classroom behavior on any given day.

Student input questions were broken down into analysis questions eight, nine, and ten. There were several student comments made that were standard. Many felt I should continue the no homework policy and continue playing music that the students put together during work times (there were complaints that I found edited versions of the songs they requested). Most students felt that I needed to be more strict with students that are disobeying rule: most said to get rid of warnings, give one detention kick them out of class and if it persists the kid should be suspended and if it happens more than 10 times in a year they should be long-termed. Students like the readings followed by the activities and the class discussions in place of taking notes. Many said they needed help with organization and test taking skills and asked if there were activities that would help them with these skills. All students agreed that I should keep giving out candy and keep being nice. Several students commented that I needed to be in one place after school its hard to find me when they stay after for help since I was all over the building. One-hundred percent of the students wanted to be taught in a science lab room or at least in a room that looked like a science room. Some commented that I should keep the marble jar and the stickers, although many of them said the jar needed to be smaller because even the really good class took three-fourths of the year to fill the jar.

The results from this last survey did not differ much from the results from the first survey. Not as many students took it this time around, 92 opposed to the 104 that took it in November. Areas in which I expected an increase did increase, even though only slightly. Two questions showed a significant increase in positive feedback. By the end of the year, there was an increase from 88% to 97% of the students claiming that they felt safe in the classroom. I attest some of this to the removal to two very violent and

troublesome students into the district's GTI (Group Tutoring Instruction) program. The other jump was in the area of peer motivation. Many students reported this time around that the Science Fair began challenging and encouraging. Some of this I feel is related to it being the end of the year. Most students were concentrating during the review sessions because the grade on the final would determine if they were going to be enrolled in summer school. Others stated that they felt the science fair project helped them to build healthy relationships with their group members and these relationships carried on through the remainder of the year. Students would work together and produce much better assignments than prior to the science fair.

Reflection, Video taping, and Lesson Plan Alterations

At the beginning of the year I started with a lot of student-centered activities and did not spend enough time developing the classroom skills that students would need to complete these activities. For example, there was not enough discipline on the part of the students to either want to complete these tasks or know how to get started on the task. I adjusted my lessons to become more teacher-centered and spent time developing skills such as note taking, organization, and proper class participation techniques so that in March I was able to start developing the more student-centered classroom that both the students and I preferred.

I was able to become more proactive in my classroom management style as I got to know the students and started recording the behavior patterns. "I know that ____ goes to the bathroom every day to get high so she is no longer allowed out of the classroom. I know that ____ will find every excuse to try and get out of the room, but if I refuse to let him go after half an hour he will settle down and do his work."

It also allowed me to start developing plans to help the students with extrinsic motivation to perform better in the classroom. I started marble jars with each of my classes and once filled, they could earn themselves a free day of class. Student performance went up a drastic 40% if I spent a day doing review with them while passing out candy. The more participation there was in the review sessions, the higher the class average on the test. In addition, only 2 or 3 students would fail as opposed to the 24 or 25 that would fail without the candy review. I also found that by the beginning of March I was able to start weaning them off of the extrinsic motivators and still saw the same level of performance; the students had internalized.

By using the video taping of the lessons, I was able to pick up on patterns and behaviors that I did not catch while in the classroom. This made me much more aware of my surroundings and which kids I really needed to put my foot down. It also cued me in to the classroom instigators, classroom leaders, and how to better utilize classroom space to maximize time on task. I would sit down with the entry from that day's reflection journal, watch the tape and take notes in a different color so they would stand out and enable me to identify patterns in behaviors that I was missing. This allowed me not only to counteract students in class, but develop lesson plans that would motivate the students' participation and achievement levels based on things that they liked and kept them on task as opposed to activities that caused them to lose interest and in turn decrease their motivation to learn (see Figures 7 and 8).

Science Fair

Student reactions and interviews to the science fair were mixed but overall very positive. The students loved participating in the science fair and showing off the work

that they did. During the course of the class time spent on this project, most of the feelings expressed were of frustration, aggravation, and at times anger. They were overwhelmed when they started the process and many expressed concerns about not being able to complete the project on time. The number of students staying after school for help with the project or just to get more work done increased each day, starting with 3 of my most talented students on the second day of the project until the day that I did the bottle rocket demonstration with the students (day 5). Once the students saw what the end product could look like and how that end product could perform, most of them were staying after school until the night before the fair when I had 65 students after school on task and working until as late as 5 pm. Students coming up to work during lunch increased from 5 on the third day of the project to nearly every student the day before the project. I had 3 rooms full of students working and other teachers had to give up their lunchtime to help monitor. Surprisingly enough, the students came up, got their projects, and began work immediately. There were no behavior problems, none of the students needed prodding, and they were taking their own incentives to troubleshoot and problem solve when they had questions. It was a beautiful sight.

By the day of the fair, students were both excited and nervous. They were relieved that it was over but more than 80% of them said they would miss it and asked when we would be doing something like that again. Students commented that they felt that this project was excessively hard at first, but by the end of it they learned so much more by doing it by themselves and applying their newly acquired knowledge. They proved their knowledge and abilities to a group of 5 judges, including the director of science for the

district. The judges all expressed positive feedback and the group of 104 students radiated with pride.

Following the fair, student motivation in the classroom was noticeably higher than before, but I cannot say for sure if it was because of the science fair. I designed a series of lessons that were inquiry based for the students to study energy transformations and heating and cooling. They were able to perform the guided inquiry activities easily and effectively, and the students attributed that to the science fair. Most of the responses centered around the idea that when they were expected to problem solve as a group for a period of 3 weeks, they were able to do it quickly and without as many problems when working with those same group of students for the remainder of the year. As a result, I feel that the science fair really increased the concept of teamwork and in turn effected the motivation of the students because they were confident that when working with these same students they could do a good job, and therefore did.

Chapter 5: Conclusions and Recommendations

Discussion

My findings from this action research project have aligned with those findings found in my literature review and to some extent, what I was expecting. The teacher does act as the primary motivator in the classroom, as I expected prior to the study, but the way in which the teacher motivates is what differed from what I believed and was not something I found in the literature review.

The most significant finding in this study was with regards to how I structured the class. I started off the year as the standard teacher in front of the room, giving notes and assigning mostly independent work or work that required one other person in a limited capacity. As the year went on and I felt that I was getting a lot of resistance from the students with regards to assignments and classroom behaviors, I modified my curriculum to include a lot more group projects in which they had to do more of the work. I stood back and guided as opposed to telling them what to do. I found that my students responded best when I acted more as a facilitator than as a classic teacher. As stated by many of the students, the projects I assigned held them to high standards and caused a lot of frustration and sometimes the desire to just give up. However, when they completed the projects they had a great feeling of accomplishment which made them want to do better in class and on the next assignment. The students did feel resentment toward the transition during the first two projects, but by the time they got the hang of what it was that I was expecting they were excited about moving on with the projects. From this feedback, I was able to conclude that I do want to move my curriculum to a more guided inquiry based derivation. I need to spend more time at the beginning of the year

explaining and having the students practice how to work as a team, develop with them what their expectations of the curriculum really is so that it is clear and some of this frustration is alleviated, and I have to work on wording my directions in a simpler and more direct manner.

The next area that I found to be of great value is that when the classic teacher model is used in the classroom, there is little to no peer motivators in place. The honors class is the only class in the November survey that felt their classmates encouraged them to do well. This was not a surprise as the honors students are the ones that have the intrinsic motivators to succeed and it is that classroom competition that keeps them on top of their studies, and why they are in our honors program to begin with. What I did find was that with the implementation of the group projects, students were really starting to understand what it meant to be part of a team. This feeling of teamwork spread from when they were working on group projects to encouragement and outward motivation even on independent assignments. This could be seen through classroom observations and a few of the students' feedback in the surveys. Instead of feeding into classroom management issues, students started to gear away from the problem behaviors, work on their own behaviors and remind other students of proper classroom behavior to ensure that work was getting done and learning was occurring. Words of encouragement to students who were struggling with classroom assignments could be heard from students that started off the year with a filthy mouth and negative attitudes. The greatest improvement could be seen in the one class that was very aggressive towards each other at the beginning of the year. This class went from physical fights every other day to a very smooth, well oiled machine by the end of April.

Action Plan

There are a lot of other areas that I found improvement in throughout the course of the year, but the two that I listed above are the focus of my action plan for the 2006-2007 school year. I feel they are the areas that impact many of the other classroom issues such as management and work ethic and I have direct control over the implementation of success in these areas. I have already taken some steps to include these motivational techniques in my classroom, the biggest being curriculum development. My plans include an intensive, comprehensive month of skills based lessons in which the content is geared at a lower level but the classroom behaviors and expectations are an integral part of the curriculum with very high standards. It includes classes on how to follow directions, how to work as a member of a team, how to delegate work, how to use the internet and the library as important research sources, how to generate above grade level results to projects and assignments, simple lessons in proper behavior, encouragement and social interactions with classmates, as well as how the class works as a whole to reach an end goal of a quality science education.

The second step to this implementation process was to talk with both of my administrators: the head of the science department and the head of my academy. The administrator that I started with at the beginning of the year and struggled with left in May and a new administrator took over. Since this new individual has accepted the administrative position, I have been able to sit down and discuss what I did this year and where I plan to go with it next year. This administrator was very open to sharing suggested plans of implementation and offer much help and support. She has also suggested and arranged for me to share my findings with my other clustermates and to

head up development of academy policies and procedures for the next year. Additionally, I have been asked to supply copies of my lesson plans to her and to my clustermates before the beginning of the next school year as to establish a basic groundwork for these expected classroom behaviors and how they can be turned into motivators for the students. The head of the science department gave her approval for the implementation plan for next year, giving her approval of my plans.

The third step was to share my findings with my building principal. I have given her a summarized version of this paper to show the research methods and the results of the research as well as my plan of implementation. I have not heard from her one way or the other on the topic, but I am expecting favorable feedback and suggestions from her as well.

The fourth step was to take my findings to the head of the science department for our district. He and I went through this research piece by piece and he was very impressed with the methods and the reflections on the lessons. He and I viewed several of the video tapes together and discussed improvements that were made throughout the year, mostly based on my change of teaching style from classic teacher centered instruction to student centered instruction where I took the role of the facilitator compared to the director. He and I went over 5 of my projects that I have developed for next year, in which he gave feedback on the content as well as the implementation, suggested assessment means, and has asked that I keep the reflection journals going for the next year. He hopes to see the results of this kind of teaching style as it is new to the district and something he hopes to implement with all teachers within the next few years if I am successful with my trial.

The fifth step is the actual implementation of the plan. I have had many extremely valuable resources for development of this action plan, but it is up to me to implement it in the classroom. I have separated the implementation of the lesson plans into three phases. Phase one is an introduction at the beginning of the year to the type of curriculum and learning they will be doing. Phase two will be reflection on the implementation of each project that will include daily reflection journals and videotaping of the lessons for further reflection and development outside of the classroom environment. Phase three is the restructuring of lesson plans and implementation techniques as necessary. There are scheduled reviews of progress with the district department head in late October, late January, late April, and late June, and end of year review to decide on the effectiveness of the implementation to be done with the academy director, school department head, and the district department head.

Recommendations for Future Research

I have already undergone the steps necessary to implement my plan into the curriculum for next year, as well as summarizing and providing copies to my clustermates. The extension to the study that I plan to focus on in the next year is the implementation and success of the plan in the classroom and to answer the original question; will and increase in motivation decrease the classroom management issues with these students? The following year I plan to look at behavior patterns of students and determine if there is a way that students who share very similar behavior patterns share the kind of motivation needed to correct the behaviors and add these results to my plan. There are many more questions and many more areas that I would like to incorporate in

this study as well, but I feel this is a sound plan and will keep me busy for the next 4 years at the very least.

Conclusions

From my research and that based in the literature review, I came to five general conclusions. First it can be concluded that it is the teacher's responsibility to motivate the students in the classroom and to maintain a classroom with reasonable expectations and goals for students. Secondly, team building activities and socialization play a key role in student learning. Third, students respond positively to set rules and routines in the classroom. Fourth, students in this age group respond well to extrinsic motivators, and those extrinsic motivators will become intrinsic over time. Finally, diversification of lessons keeps students motivated and interested in the curriculum, which will make them more likely to enjoy class and to retain the materials.

I do not expect this to be a project that is completed in the next year or even the next 10 years. This is an ongoing project that I feel will take my career to properly develop and implement into the classroom. Each year I will review my progress for that year and once satisfied with one part, I will add the other facets that I found in my research to the original plan. Each year has a different mix of students and adds a new host of problems. What works with one group may not work with another, but I am certain that the age level lends to similar belief systems and similar learning styles, and this type of curriculum development lends for motivation of students that fall into all of the above categories. With diligence and hard work, I believe that at the end of my career I will have placed a curriculum in my classroom that is effective and will lead us into the next generation of students with ease and serve as a basis in the district as a whole.

References

- American Psychological Association. (1994). *Learner-centered psychological principles: Guidelines for school redesign and reform*. Washington, D.C.: American Psychological Association.
- Ames, R., & Ames, C. (1990). Motivation and effective teaching. *Dimensions of Thinking and Cognitive Instruction*. Hillsdale, N.J.: Lawrence Erlbaum Associates.
- Bligh, D.A. (1971). *What's the use of lecturing?* Devon, England: Teaching Services Center, University of Exeter.
- Bouffard, T., & Couture, N. (2003) Motivational profile and academic achievement among students enrolled in different schooling tracks. *Educational Studies*, 29(1), 10-28.
- Cantwell, R.H., & Andrews, B. (2002). Cognitive and psychological factors underlying secondary school students' feelings towards group work. *Educational Psychology*, 22(1), 58-71.
- Cashin, W.E. (1976). Motivating students. *Idea Paper, No. 1*, Manhattan, NY: Center for Faculty Evaluation and Development in Higher Education, Kansas State University.
- Eble, K.E. (1988) *The craft of teaching*, (2nd ed.). San Francisco: Jossey-Bass.
- Eccles, J.S., Wigfield, A., Midgley, C., Reumen, D., MacIver, D., & Feldlaufer, H. (1993). Student Motivation in the Elementary School Classroom. *The Elementary School Journal*, 93(3), 553-574.
- Ericksen, S.C. (1978). The lecture. *Memo to the faculty*, 60. Ann Arbor: Center for Research on Teaching and Learning, University of Michigan.

- Guthrie, J.T., & Davis, M.H. (2003). Motivating struggling readers in middle school through and engagement model of classroom practice. *Reading & Writing Quarterly*, 19(2), 59-85.
- Harlen, W., & Crick, R.D. (2003). Testing and motivation for learning. *Assessment in Education*, 10(2), 33-45.
- Hopkins, G. (2005). *How can teachers develop students' motivation—and success?*
Retrieved on February 27, 2006 from
http://www.educationworld.com/a_issues/chat/chat010.shtml.
- Huften, N.R., Elliott, J.G., & Illushin, L. (2003) Teachers' beliefs about student motivation: Similarities and differences across cultures. *Comparative Education*, 39(3), 367-389.
- Kauffman, D.F., and Husman, J. (2004). Effects of time perspective on student motivation: Introduction to a special issue. *Educational Psychological Review*, 16(1), 1-7.
- Lucas, A.F. (1990). Using psychological models to understand student motivation. *New Directions for Teaching and Learning*, 42(2), 13-28. (I just italicized the journal)
- Lowman, J. (1984). *Mastering the techniques of teaching*. In G. DuBois (Ed.) Hidden characteristics of effective teachers. *Community College Journal of Research and Practice*, 17(1), 459-471. Washington, DC: Taylor & Francis.
- Lumsden, Linda. (2005). Motivating today's student: The same old stuff just doesn't work. *Portraits of Success*, 1(2), 3-11.
- McMillan, J. H., & Forsyth, D. R. "What Theories of Motivation Say About Why Learners Learn." In R. J. Menges and M. D. Svinicki (eds.). (1991). *College*

Teaching: From Theory to Practice. New Directions for Teaching and Learning, no. 45. San Francisco: Jossey-Bass.

Phalet, K., Andriessen, I., & Lens, W. (2004). How future goals enhance motivation and learning in multicultural classrooms. *Educational Psychological Review*, 16(1), 59-89.

Pintrich, P.R. (2003). A motivational science perspective on the role of student motivation in learning and teaching contexts. *Journal of Educational Psychology*, 95(4), 667-686.

Sass, E.J. (1989). Motivation in the college classroom: What students tell us. *Teaching of Psychology*, 16(2), 86-88.

Seifert, T.L. (2004). Understanding student motivation. *Educational Research*, 46, 2.

Tiberius, R.G. (1990). *Small group teaching: A trouble-shooting guide*. Toronto, Ontario: Institute for Studies in Education Press.

Ukpokodu, O.N. (2003) Teaching multicultural education from a critical perspective: Challenges and dilemmas. *Multicultural Perspectives*, 5(4), 17-23.

Weinert, F.E., & Kluwe, R.H. (1987). *Metacognition, motivation and understanding*. Hillsdale, N.J.: Erlbaum.

Appendix 1. Day One Student Survey

Student Name: _____

Parent/Guardian Name: _____

Contact Numbers in case of an emergency: _____

Address: (street address is fine I do not need zip codes) _____

What are some of your hobbies?

Do you have any special interests?

What is your favorite thing/what do you like best about science?

DO NOT PUT YOUR NAME ON THIS PAPER.

Content Based Questions

- 65

4. Do you feel that I am prepared to teach you when you come into class? (For example, when I teach a lesson does it appear that I put a lot of time and thought into how I will teach you something?)

5. What do you think your strongest area is? (for example you do really well with individual activities where you read and answer questions, or you are a really good artist and enjoy AND learn when you are able to take the notes and turn it into something else, or you enjoy writing and express yourself and what you are learning when you are allowed to write it as an essay)

6. What do you think your weakest area is? (for example, I feel that I am a terrible writer and that I express things better when I can make a chart or draw a picture instead of write an essay or I have a real hard time with multiple choice questions and could answer the question better if I could write what I know instead of trying to find the right answer)

7. How much time outside of class do you spend studying? (This includes looking over notes each night as well as right before a test).

8. Do you feel that I truly want you to learn and that I am doing everything I can to make sure that you come away with a good science education this year? If yes, explain why. If no, explain why not.

Classroom Environment

1. When you come to class, do you feel safe? If yes explain why. If no, explain why not.

2. Do you feel that you and your classmates respond to me when I give directions (think both for behavior and for assignments)? If yes, explain why. If no, explain why not. Include in your explanations reasons why you feel that you or your classmates act the way they do. (for example, I feel that I do respond to you because if you ask me to be quiet I am quiet because I don't want to get in trouble but I think that the other students don't respond to you because they don't really care if they get detention or not)

3. What types of things do I do that helps you to pay attention and want to finish your work or pay attention in class?

4. What types of things do I do that you don't like and make you not want to do your work or pay attention in class?

5. Motivation is something that helps you to do well and complete your tasks. Intrinsic motivation is motivation that comes from the inside: I want to do well because I like to see that A on my report card and I know that means that I did my best and it makes me proud. I also know that my parent will be proud of me and that is enough for me to want to do well. Extrinsic motivation is motivation that comes from the outside: I know that if I get an A in class my parent will get me a new pair of sneakers or if I behave I know that Ms L will give me a sticker or a piece of candy.

Do you think that you have intrinsic motivation? If yes, explain it. If no, explain why not.

Are you extrinsically motivated? What kinds of extrinsic motivation do you have in the classroom? At home?

Answer true or false to this statement:

I have no motivation. I don't care about my grade, I don't care what someone gives me if I behave or if I do well. I come to school to hang out with my friends and I could care less if I learn anything at all this year and no one is going to convince me otherwise.

If you answered true to the statement above, explain why that is. If you answered false to the statement above, tell me what is motivating you to behave and to succeed in the classroom.

6. Do you think that I am fair? Why or why not?

Answer the questions below with yes or no.

1. When I come to school, my main goal is to be popular.
2. I like being the class clown.
3. I feel that learning science will be important to my future.
4. My friends help me to do well in school: they encourage me to complete assignments and challenge me to do my best.
5. I like the other kids in my class.
6. I feel lost when I am in class because of everyone else's behavior.
7. I feel lost in class because I do not understand what is being taught.
8. I feel that I have learned a lot this year in science.
9. I feel that I deserved the grades that I get.
10. I feel that Ms L expects too much of me.

Circle always, sometimes, or never for the following questions.

- | | | | |
|---|-----------|--|-------|
| 1. I get warnings and I don't know why. | | | |
| Always | Sometimes | | Never |
| | | | |
| 2. My behavior is getting in the way of my learning in class. | | | |
| Always | Sometimes | | Never |

3. I go home at night and I think about what I can do to bring up my grades.

Always

Sometimes

Never

4. Ms L encourages me and tries to help me do my best.

Always

Sometimes

Never

5. Ms L takes time out to help me to understand difficult topics or to explain directions if I did not understand them the first time.

Always

Sometimes

Never

6. I go home at night and think about how my behavior in class is keeping me from doing my best.

Always

Sometimes

Never

Analysis Questions

1. Tell me about your behavior in the classroom. Explain why you behave the way that you do.

2. I have set classroom expectations on how you should behave in class, coming to class prepared and completing classroom assignments. Do you feel that my expectations of you are too high? Too low? Explain why they are too high or too low.

3. What types of things help you to learn the best?

4. Do you feel that you are learning anything in class? Why or why not?

5. What types of things can I do to help motivate you?

6. How do you think that I can plan lessons differently to keep you focused on your work instead of your friends and gossip?

7. When I put you with a partner or in a group, do you feel that you get the work done in a timely fashion and that you spend more time on task to complete your assignment or do you feel that you work better alone and that working with friends makes it harder for you to concentrate and get things done?

8. I know that when I am at home doing work I need to have music on or the TV going even though I am not paying attention to it. Do you feel that you work better when you have this white noise or not?

9. What things would you like to see change in the classroom?

10. Do you think that I am too lenient or too strict when it comes to dealing with behavior issues in the classroom?

11. Your reason for being in school is to get an education. There are proper times to socialize and play with your friends, but the classroom is not one of them. What types of behaviors keep you from concentrating on your work? How do you feel they should be dealt with to help you to get a better education?

12. When you are in class, do you feel that your behavior and your choices are keeping you from getting your work done or it is the behavior and choices of your classmates that is the biggest problem?

13. Your class is full of extremely bright students. After going through grades and averaging out scores, your class has a test average of 48%, a class work average of 63%, a class average of people making up work that they missed of 3%, and a homework average of 62%. Why do you think that these averages are so low? (none are passing

averages and it is a VERY select few that help you to maintain these averages). What kind of motivation can we use as a class to help you work to your full potentials and to have grades that reflect your true abilities?

14. How do you feel the administration affects your work in the classroom? This would include school rules that have been established in order to keep peace in the school.

Appendix 3. Self Assessment Sheets

Name: _____

Date: _____

Self Assessment Reflection Sheet

Part I. Give yourself a grade on the following questions, 0 being you didn't do it and 5 meaning it was completed 100 %

1. Did you complete your warm up?
2. Did you come to class prepared?
3. Did you participate?
4. How did you do during your transitions between activities?
5. Did you stay on task and complete your class work?

Part II. Give yourself a grade based on the following statements. An A is for exemplary work and an F is failing.

Discuss your behavior in class today.

Discuss your motivation in class today.

Class work: Description: _____ Grade: _____

Total Grade: _____

****Failure to hand this in will result in a 0 for the day****

Appendix 4. End of First Semester Survey

DO NOT PUT YOUR NAME ON THIS PAPER

Answer the questions below honestly. Remember, you are not putting your name on these papers so your answers will remain anonymous and will not affect your grade in any way.

1. When I am in class, I am there to pay attention and to learn.

1	2	3	4	5
Strongly	Disagree	No opinion	Agree	Strongly
Disagree				Agree

2. I find that the way that Ms L prepares her lessons makes it fun for us to learn.

1	2	3	4	5
Strongly	Disagree	No opinion	Agree	Strongly
Disagree				Agree

3. I like the activities that we do in class and they help me to better understand the materials and make me want to learn.

1	2	3	4	5
Strongly	Disagree	No opinion	Agree	Strongly
Disagree				Agree

4. I feel that Ms L used the information from the survey we took in November and put it to work in our classroom so that I am motivated and want to come to class.

1	2	3	4	5
Strongly	Disagree	No opinion	Agree	Strongly
Disagree				Agree

5. I am more likely to participate when Ms L is giving out candy.

1	2	3	4	5
Strongly	Disagree	No opinion	Agree	Strongly
Disagree				Agree

6. I like to participate in class because it helps me to understand that material better and I feel like I am learning if I can answer questions about it.

1	2	3	4	5
Strongly	Disagree	No opinion	Agree	Strongly
Disagree				Agree

7. I do not need a reward to want to do well in school.

1	2	3	4	5
Strongly	Disagree	No opinion	Agree	Strongly
Disagree				Agree

8. I feel that I have made an effort to improve my grades and my participation in class because I want to.

1	2	3	4	5
Strongly Disagree	Disagree	No opinion	Agree	Strongly Agree

9. The survey that I took in November helped me to focus on what I should be doing in class.

1	2	3	4	5
Strongly Disagree	Disagree	No opinion	Agree	Strongly Agree

In the space below, discuss anything that you feel would benefit you in the classroom.
How can I help you to want to do well in class?

DO NOT PUT YOUR NAME ON THIS PAPER

1. When I am in class, I am there to pay attention and to learn.				
1	2	3	4	5
Strongly	Disagree	No opinion	Agree	Strongly
Disagree				Agree

2. I find that the way that Ms L teaches her lessons makes it fun for us to learn.				
1	2	3	4	5
Strongly Disagree	Disagree	No opinion	Agree	Strongly Agree

3. I like the activities that we do in class and they help me to better understand the materials and make me want to learn.

1	2	3	4	5
Strongly Disagree	Disagree	No opinion	Agree	Strongly Agree

4. I feel that Ms L used the information from the survey we took in January and put it to work in our classroom so that I am motivated and want to come to class.

1	2	3	4	5
Strongly Disagree	Disagree	No opinion	Agree	Strongly Agree

5. I am more likely to participate when Ms L is giving out candy.

1	2	3	4	5
Strongly Disagree	Disagree	No opinion	Agree	Strongly Agree

6. I like to participate in class because it helps me to understand that material better and I feel like I am learning if I can answer questions about it.				
1	2	3	4	5
Strongly Disagree	Disagree	No opinion	Agree	Strongly Agree

7. I do not need a reward to want to do well in school.

1	2	3	4	5
Strongly Disagree	Disagree	No opinion	Agree	Strongly Agree

8. I feel that I have made an effort to improve my grades and my participation in class because I want to.

1	2	3	4	5
Strongly	Disagree	No opinion	Agree	Strongly
Disagree				Agree

9. The survey that I took in January helped me to focus on what I should be doing in class.

1	2	3	4	5
Strongly	Disagree	No opinion	Agree	Strongly
Disagree				Agree

10. Since January, I feel that both the way Ms L changed around her lessons and the fact that I have put more time and effort into my work has increased my enjoyment of the class and has helped me to want to do well for myself.

1	2	3	4	5
Strongly	Disagree	No opinion	Agree	Strongly
Disagree				Agree

In the space below, discuss anything that you feel would benefit you in the classroom. Since January, have you found there to be an improvement in the lessons that make you want to participate and learn?

Appendix 6. End of the Year Surveys

DO NOT PUT YOUR NAME ON THIS PAPER.

As you are filling out the survey below, keep in mind that this will in NO WAY affect your grade for the year. Answer openly and honestly, being as specific as possible and include examples as often as you can. At no point in this research will your names be used.

Content Based Questions

1. Did you find the content that you are learned interesting? If yes, explain why (include the units/topics that you liked and why). If no, explain why not.

2. Did you find the way that the content was presented interesting? What makes it interesting? What do find boring? (for example, I really like doing hands on projects like the models of the Earth or I really don't get a lot out of watching videos like the Bill Nye video on the human body systems)

3. Do you feel that I am knowledgeable when it comes to what I am trying to teach you? (for example, if you ask a question am I able to answer it or do I make something clear to you that was not clear the first time that I taught it?)

4. Do you feel that I am prepared to teach you when you come into class? (for example, when I teach a lesson does it appear that I put a lot of time and thought into how I will teach you something?)

5. What do you think your strongest area is? (for example you do really well with individual activities where you read and answer questions, or you are a really good artist and enjoy AND learn when you are able to take the notes and turn it into something else, or you enjoy writing and express yourself and what you are learning when you are allowed to write it as an essay)

6. What do you think your weakest area is? (for example, I feel that I am a terrible writer and that I express things better when I can make a chart or draw a picture instead of write an essay or I have a real hard time with multiple choice questions and could answer the question better if I could write what I know instead of trying to find the right answer)

7. How much time outside of class do you spend studying? (This includes looking over notes each night as well as right before a test).

8. Do you feel that I truly want you to learn and that I am doing everything I can to make sure that you come away with a good science education this year? If yes, explain why. If no, explain why not.

Classroom Environment

1. What types of things did I do that helps you to pay attention and want to finish your work or pay attention in class?

2. What types of things did I do that you don't like and make you not want to do your work or pay attention in class?

3. Motivation is something that helps you to do well and complete your tasks. Intrinsic motivation is motivation that comes from the inside: I want to do well because I like to see that A on my report card and I know that means that I did my best and it makes me proud. I also know that my parent will be proud of me and that is enough for me to want to do well. Extrinsic motivation is motivation that comes from the outside: I know that if I get an A in class my parent will get me a new pair of sneakers or if I behave I know that Ms L will give me a sticker or a piece of candy.

Do you think that you have intrinsic motivation? If yes, explain it. If no, explain why not.

Are you extrinsically motivated? What kinds of extrinsic motivation do you have in the classroom? At home?

Do you feel that as the year went on you became more intrinsically or extrinsically motivated? Why?

Answer true or false to this statement:

I have no motivation. I don't care about my grade ~~is~~, I don't care what someone gives me if I behave or if I do well. I come to school to hang out with my friends and I could care less if I learn anything at all this year and no one is going to convince me otherwise.

If you answered true to the statement above, explain why that is. If you answered false to the statement above, tell me what is motivating you to behave and to succeed in the classroom.

Did you answer to the above question change from the survey you took in November?

4. Do you think that I am fair? Why or why not?

Answer the questions below with yes or no.

1. When I come to school, my main goal is to be popular.

2. I like being the class clown.

3. I feel that learning science will be important to my future.

4. My friends help me to do well in school: they encourage me to complete assignments and challenge me to do my best.

5. I like the other kids in my class.

6. I feel lost when I am in class because of everyone else's behavior.

7. I feel lost in class because I do not understand what is being taught.

8. I feel that I have learned a lot this year in science.

9. I feel that I deserved the grades that I get.

10. I feel that Ms L expects too much of me.

Circle always, sometimes, or never for the following questions.

1. My behavior is getting in the way of my learning in class.

Always

Sometimes

Never

2. I go home at night and I think about what I can do to bring up my grades.

Always

Sometimes

Never

3. Ms L encouraged me and tries to help me do my best.

Always

Sometimes

Never

4. Ms L took time out to help me to understand difficult topics or to explain directions if I did not understand them the first time.

Always

Sometimes

Never

5. I go home at night and think about how my behavior in class is keeping me from doing my best.

Always

Sometimes

Never

Analysis Questions

1. Tell me about your behavior in the classroom. Explain why you behave the way that you do.

2. I set classroom expectations on how you should behave in class, coming to class prepared and completing classroom assignments. Do you feel that my expectations of you are too high? Too low? Explain why they are too high or too low.

3. What types of things helped you to learn the best?

4. Do you feel that you are learned anything in class? Why or why not?

5. What types of things did I do to help motivate you?

6. How do you think that I can plan lessons differently to keep you focused on your work instead of your friends and gossip?

7. When I put you with a partner or in a group, do you feel that you get the work done in a timely fashion and that you spend more time on task to complete your assignment or do you feel that you work better alone and that working with friends makes it harder for you to concentrate and get things done?

8. I know that when I am at home doing work I need to have music on or the TV going even though I am not paying attention to it. Do you feel that you work better when you have this white noise or not?

9. What things would you like to see change in the classroom?

10. Your reason for being in school is to get an education. There are proper times to socialize and play with your friends, but the classroom is not one of them. What types of

behaviors keep you from concentrating on your work? How do you feel they should be dealt with to help you to get a better education?

11. When you are in class, do you feel that your behavior and your choices are keeping you from getting your work done or it is the behavior and choices of your classmates that is the biggest problem?

12. Do you feel that the daily self reflection sheets helped you to stay on track and improve your motivation to learn in the classroom? Why or why not? What did they help you with (if anything)?

13. What things do you think I should change to help the students to be motivated about doing their work next year? What kinds of things do you think will help you to be motivated to succeed next year?

14. What was your favorite thing we did this year that helped you want to learn?

15. How did the administration help or hinder your classroom performance?

Appendix 7. Sample Entry from Reflection Journal

Daily Reflection/Video Reflection

October 27th

Science 7th

Covalent Bonding

Lesson Plan

- Strong plan, perhaps directions were too complicated
- objectives outlined - TOD reflected learning (6 of 7 groups computed correct model)
- more practice examples next time
- ~~also~~ develop simpler bonding examples
- glucose challenge worked well

Classroom Management

- need to follow through on discipline more frequently/consistently
- more practice of voice level management needed
- premade packets worked out well
- work on smoother transitions (know when to pass out materials)

*censor was out of seat poking most of activity time
also refused to move his seat when directed to several times

+ reading during notes section

Need new consequences for lateness, walkmans, + cellphones in class - heftier since detention is not deterring them

Student Motivation

- students on task most of class, 2 major behavior problems (students refused to complete project because of numbers assigned to group with them)
- activity engaged students + all but above 2 determined to complete activity
- assigned groups → 6 of 7 worked well together

The two reading had firm grasp of material - maybe enrichment activities

+ phone calls to parents - constant problem especially with distractions of others - other student's responded by

ignoring them or telling them to go away + let them work

Appendix 8. Sample Lesson Alteration Following Review of Reflection Journal Entry and Video Tape Viewing

Lesson Plan for Thursday, October 27th, 3/4 block.

Class Information and Background: This is a 7th grade honors class that consists of 26 students. They have been studying the chemistry unit, having covered atomic structure, trends in the periodic table and ionic bonding. They are continuing this unit with covalent bonding.

NYS Standards:

Standard 4: The Physical Setting, P1 3.3,

Major Understanding 3.3c (Atoms may join together in well-defined molecules or may be arranged in regular geometric patterns).

Major Understanding 3.3d: Interactions among atoms and/or molecules result in chemical reactions (bond formation).

Standard 6: Interconnectedness: Common Themes. Key Idea 2: Models are simplified representations of objects, structures, or systems used in analysis, explanation, interpretation, or design. 2.1 Select an appropriate model to begin the search for answers or solutions to a question or problem. **2.2** Use models to study processes that cannot be studied directly.

Behavioral Objectives:

1. Understand covalent bonding by taking notes and participating in an informal questioning session throughout note set.
2. Define covalent bonds by taking notes.
3. Build an ionic or covalent bond based on prior knowledge of atomic structure and principles of bonding by participating in a small group activity (continuation of Crazy Compounds Lab that they started 2 weeks ago).

The Lesson:

Anticipatory Set: Word of the Day: Reactions. (this is a literacy strategy that introduces students to new vocabulary and reinforces literacy in any classroom setting.) **Engage**

Activity One: S ____ Covalent Bonds. (notes)

Essential Questions: What is a covalent bond? Once the bond is formed, what is made?

→ make skeletal notes, include examples
→ shorter, students got antsy after the half hour of notes
Activity Two: Building Atomic Structures. Students will take the elements that they were assigned and build the electron configuration models using construction paper, posterboards, and glue. - worked very well

Activity Three: Each of the elements that they were assigned were color coded so that when they are put together they will form very specific compounds. Students will find the people that had the same color element and build their compounds. Once they have their compound put together and named, one of the group members will come up and receive some information on their compound.

- color coding worked well, plan who gets what element next time
- pre-made packets were a great idea

Compounds formed:

water	oxygen	ozone
salt	potassium chloride	hydroxide
carbon monoxide	carbon dioxide	potassium bromide
<u>carbonate</u>	hydrogen chloride	

tough one - something else next time?

There is a group writing assignment that goes along with the project (outlined in the packet attached).

Independent Practice: Study for the test on Monday. - need a more comprehensive review packet

Closure: I will call out to one person in each group to identify their compound and whether it formed an ionic or covalent bond.

↳ great motivator
↳ student on overhead worked well

Appendix 9. Energy Afternoon Project Packet

Energy Afternoon

A 7th Grade Science Fair

Requirements:

- ✓ You must be in the 7th grade
- ✓ You must fulfill the behavior guidelines that have been set forth.
- ✓ You must work in a group with 3 other students. (NO independent work)
- ✓ You must be respectful of your teammates, of your classmates, and of your upperclassman sponsor.
- ✓ You must not be afraid to try new things
- ✓ You must not be afraid to have to try again and again if you don't succeed at first (remember: science is a trial and error subject. Even the greats like Aristotle, Einstein, Darwin, Mendel, Currie, and many more made a lot of mistakes before they made the significant discoveries that we hold true today!!)
- ✓ You must stay on task to complete the first three projects before the day of the event: remember, your fellow schoolmates will be coming out to view your accomplishments and there will be prizes awarded for a variety of different things. You are being judged by teachers, staff, and students outside of the 7th grade. Task 4 is optional, but there will be a prize awarded for the event and really is a lot of fun.

This project is serving as your test for this unit. Each task contains directions for completing the task as well as a written component. You will need to meet with your group to decide who will do what job and how you will use your time the most efficiently (how to arrange tasks to get them done correctly in the amount of time that you have been given to complete the tasks).

You will be graded based on the rubric attached. You also have a copy of the judges' performance evaluation so you know ahead of time what the judges are looking for to award prizes for the afternoon. Use the rubric as a checklist to make sure you have included everything that you need to in order to get a good grade.

Each group will be working with 1 or 2 upper classmen that take physics with Mr. Deaton or Mr. Conrow. Do not be afraid to ask them questions and get them involved in your project: they are your "experts" on energy and will be a valuable resource for your team.

Task 1. The Roll-back Toy

Introduction:

Background Information: You are creating a smaller version of the bucket with the sandbags that you saw in the Bill Nye video on energy. This task shows how potential energy works. Once you have constructed your model, you will notice that one side of the rubber band will stay stationary while the other side twists around. This twisting is building up that potential energy (energy of position) and when released it will transform that potential energy into kinetic energy.

Problem: How can we construct a roll-back toy that possesses the greatest amount of potential energy?

Hypothesis: (write your problem in your journal and record your hypothesis (LABELED) in your journal as well)

Materials:

- ✓ A clear plastic soda bottle
- ✓ One thick rubber band about 8-10 cm long
- ✓ Two toothpicks or paper clips
- ✓ Several nuts (the backing to screws that help to hold them in place when you are building things) or washers tied together with a twist tie
- ✓ String
- ✓ Hole punch

Procedure:

1. Punch a hole through the lid and the bottom of the soda bottle. Take the lid off the container.
2. Thread a string through the bottom of the bottle and pull it through the lidless top of the container (make sure there is still string hanging out the bottom end.)
3. Tie the end of the string that you pulled through the top to one end of the rubber band (you will use the string as a lead to help thread the rubber band through the container).
4. Tape the washers together and then connect them to the middle of one section of the rubber band (do not tape the strands of the rubber band together)
5. Put the end of the rubber band (the end not connected to the string) through the container lid. Use a toothpick to secure the band so that it does not slip inside the container (put the toothpick through the end loop of the rubber band that remains outside the hole). Put the lid on the container (making sure the string is still sticking out the other end).
6. Carefully pull on the thread until the rubber band comes through the hole. Secure the band with the second toothpick. Be sure to situate the weight so it is in the center of the container and does not touch the sides. Your roll-back toy is ready to go!!!
7. Roll the toy and watch as the weight holds one strand of the rubber band stationary while the free side twists around. Release and watch the toy roll back towards you demonstrating kinetic energy.

****Hints when putting together your team's roll back toy:**

- ✓ the farther the toy is rolled the more potential energy is built up
- ✓ check your variables in the experiment: remember you are being judged on who can build a roll-back toy that will gain the greatest amount of potential energy. That potential energy is transformed into kinetic energy, so the more potential energy you can provide it with, the more kinetic energy will be produced.

Data (to be recorded in your team's journal)

Record observations made through out the construction. You should be constructing this toy several times and running tests that will help it to travel the farthest. Remember our magic number in science is 3: you should be testing your toy three times each time you make a new one. Be sure to record EXACTLY what it is that you changed each time because your second toy gives you the best results, you will need to know exactly what you did to build it again to enter it into the contest.

Your independent variable is the variable that you are changing each time. The dependent variable is the variable that changes depending on the change that you made to the independent variable. Everything else in your experiment should remain the same. Identify in your journal what the independent variable is, what the dependent variable is, and what things you were keeping constant (the same). Remember, if you change more than one thing at a time you will not know what change gave you the better outcome (your toy traveling the farthest distance).

Your results section is to include a table and a graph. You need to design the table and graph the data using the information in the table. Both the table and the graph should be found in your journal AND on the visual aide that you create for this task.

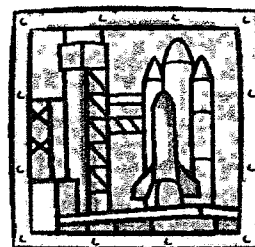
Conclusion (to be answered in your team's journal)

1. We (accept/reject) our hypothesis because.....
2. Two sources of error that may have been found in our experiment are:
 - a.
 - b.
3. A further investigation question we might ask is...

Analysis Questions (to be answered in your team's journal):

1. As your rubber band twists, you are building up your toy's potential energy. Describe the relationship between the twists in the rubber band and amount of potential energy the toy has.

2. When you let go of your toy, the potential energy that you built up in the rubber band is transformed (changed) into kinetic energy. Describe the relationship between the potential energy and the kinetic energy in the toy.
3. List some of the questions the team asked them selves as you built your toy that helped the team construct a toy that traveled the farthest distance.
4. Your team is judging the success of your toy based on the distance it traveled. Describe the relationship between the potential energy, kinetic energy, and the distance traveled.



Task 2. Up, Up, and Away!!!

Introduction:

Background: Launching something as large as the space shuttle is a complex project. But scientists can send this huge vehicle into orbit partly because they understand the natural laws that describe how objects move. Scientists discovered these laws years ago. Yet the laws are still fundamental to every rocket launch, even the bottle rocket that you will launch in this lab. The same law that states how hitting a tennis ball makes it go faster also tells how rockets are launched. This law is Newton's third law of motion.

'Newton's third law of motion' states that for every action there is an equal and opposite reaction. Newton's third law also applies to rockets. A rocket gets its lift from the gases pushing out of its tail. The force of the rocket pushing on these gases is the action force. The gases exert an equal but opposite force on the rocket, which forces the rocket up. This is called the reaction force.

The rocket gases do not have to push against anything, such as the ground. The reaction force exists even in outer space, even if there is no air for the gasses to act on. When astronauts need to change a rocket's path slightly, they rely on the action of gases. A rocket expels gas in one direction creating a reaction force that pushes the rocket in the opposite direction. The rocket accelerates.

Newton's Laws

I. Every object in a state of uniform motion tends to remain in that state of motion unless an external force is applied to it.

II. The relationship between an object's mass m , its acceleration a , and the applied force F is $F = ma$. Acceleration and force are vectors (as indicated by their symbols being displayed in slant bold font); in this law the direction of the force vector is the same as the direction of the acceleration vector.

III. For every action there is an equal and opposite reaction.

What is a bottle rocket and what does it have to do with science?

A bottle rocket is a 2-liter (soda) bottle with compressed air and water released in an upward direction. It has everything to do with science because we can use this tool to learn many concepts about motion, forces, energy and flight as well as the scientific method.

Why do bottle rockets fly?

The air pressure propels the bottle rocket skyward.

What is the expected outcome for these rockets?

The objective is to keep the rocket in the air as long as possible.

Other events may have other objectives, such as, long distance, hitting a target, landing an egg safely, or even making a field goal, but for the purposes of this we will just try to keep it aloft for a maximum period of time.

Problem: How can our team design the rocket that will stay in the air for the longest period of time?

Hypothesis:

Bottle Rocket Demo: Answer the following questions.

1. Why did the rocket that was full of water barely take off?

2. The rocket didn't have enough "oomph" (force) to make it take off. Why?

3. Why did the water go one way and the rocket the other?

Other Questions to Consider when designing the rockets:

Why do we have to use water, or do we?

Will it fly without water?

If a little water works well, will a lot of water work better?

Will it fly best when it is totally full?

What volume of water works best?

How high does it fly?

Do fins help keep the rocket stable?

Does a parachute help keep it aloft?

How might a parachute work?

Design Ideas: (Materials needed are listed in each section of the rocket assembly)

Fins:

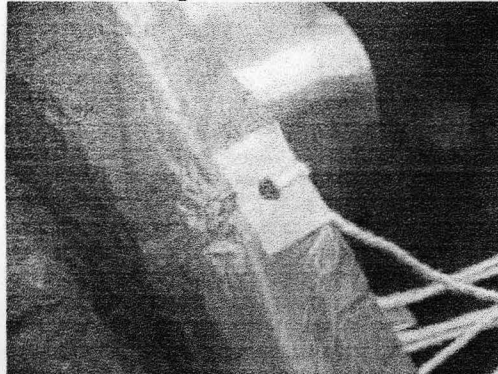
---Fins should be firm; If they flop around they are useless.

---Fins should be adequately secured; duct tape works well

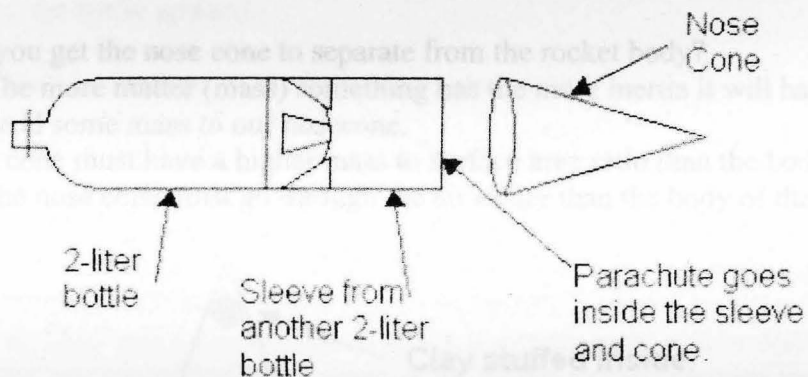
---I have seen many different types of fins and the best fins have been made of rigid card board such as a manila folder.

Parachute:

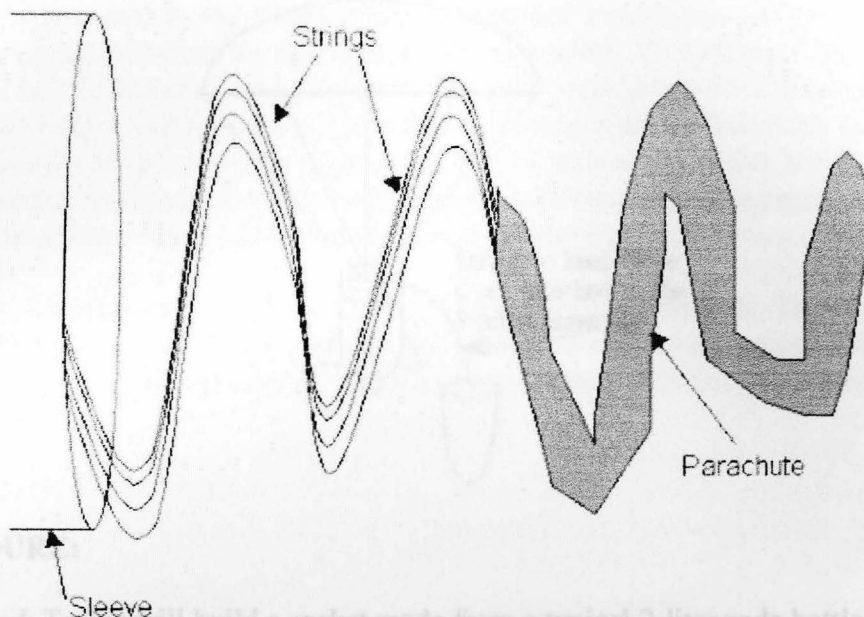
- A garbage bag parachute will do the trick
- cut the bag, lay it flat
- Attach strings in the manner indicated in the following picture
- I would suggest that you use 16 strings.



Attach the parachute to the inside of the sleeve, underneath the nose cone as the following diagram indicates

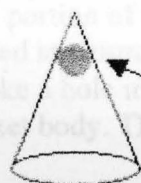


- Use the "Z" fold, do not wrap the strings around the parachute.



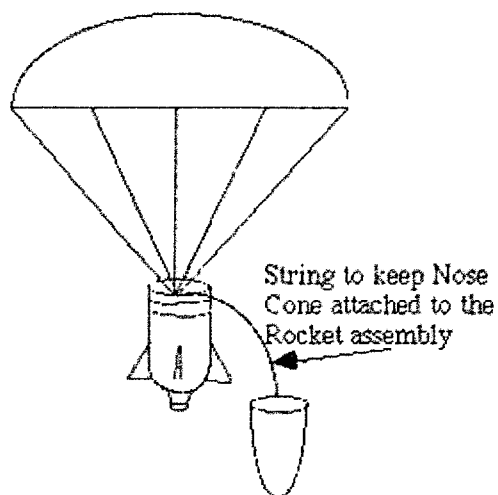
Nose Cone:

- ***How do you get the nose cone to separate from the rocket body?
- ***Inertia. The more matter (mass) something has the more inertia it will have. Therefore, we must add some mass to our nosecone.
- ***The nose cone must have a higher mass to surface area ratio than the body of the rocket. The nose cone must go through the air easier than the body of the rocket.



Clay stuffed inside.

- ***Once the nose cone separates it must remain linked to the body of the rocket.
2. The pressurized portion of the rocket must consist of one plastic 2-liter pop bottle. The manufactured integrity of the bottle cannot be altered in any way. Don't poke holes in the bottle. No modifications will be allowed on the pressurized rocket body. The mass of the empty rocket assembly cannot exceed 300 grams.
 3. All energy imparted to the rocket must originate from the water/air pressure combination. No other potential or kinetic source of energy will be permitted.
 4. Each rocket launched must pass a safety inspection and have a mass measurement taken.
 5. Though various rocket components may separate during the flight, all must remain linked together with a maximum distance not to exceed three (3) meters. If a nose cone is used, it can separate, but should remain attached to the rocket body. If any part of the rocket becomes unattached during flight, the rocket will be marked as a detachment and no bonus points will be awarded.
 6. Caution: No materials will be allowed that can compromise the integrity of the plastic bottle (e.g., hot glue or super glues). Cold glue is acceptable. Sanding or other alteration of the plastic used for the pressurized body is not allowed. Use of duct tape is highly recommended as the main type of fastener.



PROCEDURE:

Background: Teams will build a rocket made from a typical 2-liter soda bottle. The opening of the bottle must be the normal sized opening (9/16" inside diameter). The bottle will be turned so that the opening is down and will expel water and air downward, thus pushing the bottle upward.

The rocket must be made to fit the following parameters:

1. Students will bring one completed 2-liter bottle rocket to school. No commercially finished or model products may be used. Students should place their name and period number on the rocket.
2. The pressurized portion of the rocket must consist of one plastic 2-liter pop bottle. The manufactured structural integrity of the bottle cannot be altered. In other words, Don't poke a hole in the bottle!!! No metal parts will be allowed on the pressurized rocket body. The mass of the empty rocket assembly cannot exceed 300 grams.
3. All energy imparted to the rocket must originate from the water/air pressure combination. No other potential or kinetic source of energy will be permitted.
4. All rockets will be launched at a pressure not to exceed 60 pounds per square inch. Once the rocket is pressurized, no student can touch or approach the rocket.
5. Each rocket launched must pass a safety inspection and have a mass measurement taken.
6. Though various rocket components may separate during the flight, all must remain linked together with a maximum distance not to exceed three (3) meters. If a nose cone is used, it can separate, but should remain attached to the rocket body. If any part of the rocket becomes unattached during flight, the rocket will be marked as a detachment and no bonus points will be awarded.
7. Caution: No materials will be allowed that can compromise the integrity of the plastic bottles (e.g., hot glues or super glues). Cold glue is acceptable. Sanding or other abrasion of the plastic used for the pressurized body is not allowable. Use of duct tape is highly recommended as the main type of fastener.

SCORING: There will be two actual launches per team. Practice launches will be allowed, but must be before the due date and arranged with Ms Laiosa or Mrs Ortenzi. All rockets will be launched using the launching pad provided by Ms Laiosa or Mrs Ortenzi. The judges will time the rocket's flight. Timing of the rocket starts when the rocket leaves the launch pad, and stops when the first part of the rocket hits the ground, when the rocket disappears from the judges' sight, or when the rocket impacts or gets entangled in an object (e.g. the rocket collides with a tree.)

Bonus points will be awarded for those rockets that set time standards. The winning rocket will be determined by the greatest time aloft (recorded to the nearest hundredth of a second). Three timers will be used and the time recorded will be an average of the three times.

Task 3. The Ball and Ramp (This task has been modeled from the NYS test that you will be taking next year.)

Introduction:

Background Information: Ramps are a form of simple machine that are used frequently to help alleviate (take away) some of the work that people need to do if they are lifting objects. For example, if you have to move a heavy couch up onto a truck to move it, you might want to use a ramp to slide it up or slide it out of the couch instead of lifting it directly into the truck.

In this task, we are testing two variables: to find out how far a golf ball moves a cup when the ball is released from different heights on a ramp and how the mass of the cup will affect the distance it moves by the golf ball. You will need to identify some variables that will affect how far the cup moves. In order to do this, you will have to formulate your hypothesis and design an experiment to test that hypothesis.

Problem:

1. How does the release distance affect the distance traveled by the cup?
2. How does the mass of the cup affect the distance traveled by the cup?

Hypothesis: (Record your problems and your hypotheses for each problem in your team's science journal)

- 1.
- 2.

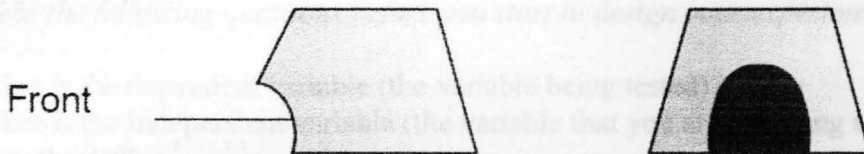
Materials:

- ✓ Plastic ruler with a groove
- ✓ Support block(s)
- ✓ Golf ball
- ✓ Plastic cup with a hole
- ✓ Placemat with measuring strip
- ✓ A quarter
- ✓ Various items to increase the mass of the cup

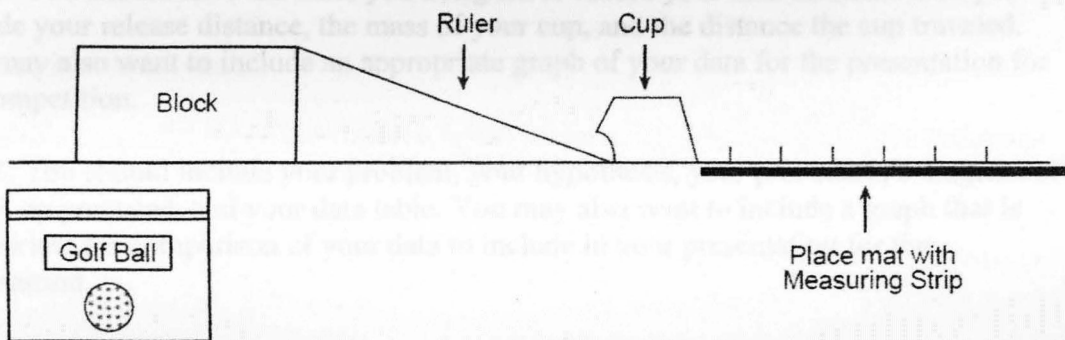
Procedure:

Part 1. Testing how release distance will affect distance moved by the cup.

1. From the rim of the cup, cut a hole (about 6cm by 6cm) that allows enough room for the golf ball to roll inside. Tape the quarter to the top of the cup.



2. Your plastic ruler will serve as your ramp for rolling the golf ball. Make sure you are using the metric units of measurement when you are recording your data. You will place the zero end on the table and the 28cm/29cm mark at the edge of the ramp support (the block).
3. Assemble the ramp as shown in the picture below:



****Note:** The cup gets placed in the “Starting Circle” on the placemat.

4. You will be releasing your golf ball from 3 different release points on your ruler during this part of the experiment (note I said release not push points. When you release the ball you will just take your hand off the ball, not add extra force to it by pushing it down the ramp). You will release once from the 15cm mark, the 20cm mark, and release three times from the 25cm mark. The mass of your cup is _____ grams.
5. Using the information above, design a table in your journal to record your data in.

Part 2. Testing how the mass of the cup will affect the distance the cup moves

1. For this section, you will need to design your own experiment to test your hypothesis, including ramp set up design and designing your own data tables for the data section. Write your step by step procedure in your team's science journal.
2. Perform the experiment you designed.

******Answer the following questions before you start to design your experiment:**

1. What is the dependent variable (the variable being tested)?
2. What is the independent variable (the variable that you are changing to test your hypothesis)?
3. What would you recommend about the release point of the golf ball each time a new cup is tested?

Data (to be recorded in your team's journal)

Part 1. You should have the table you designed to record your data in. Make sure you include your release distance, the mass of your cup, and the distance the cup traveled. You may also want to include an appropriate graph of your data for the presentation for the competition.

Part 2. You should include your problem, your hypothesis, your procedure, a diagram of the set up you used, and your data table. You may also want to include a graph that is appropriate for comparison of your data to include in your presentation for the competition.

Conclusion (to be recorded for EACH part in your team's science journal)

1. We (accept/reject) our hypotheses because.....
2. Two sources of error that may have been found in our experiment are:
 - a.
 - b.
3. A further investigation question we might ask is...

Analysis Questions (to be answered in your team's science journal):

Part 1. Travel distance based on release point.

1. Your team probably found that the cup traveled slightly different distances when you released the ball three times from the 25cm mark. Give two reasons that might explain why the cup did not stop at the exact same spot each time
2. Describe the relationship between the release distance and the distance traveled by the cup

Part 2. Designing your own experiment

1. How did writing your hypothesis, identifying your dependent and independent variables, and making a decision about the release point of the golf ball before you started your experiment assist you in designing the experiment you would be performing?
2. Describe the relationship between the mass of the cup and the distance the cup traveled.

Combining Parts 1 and 2.

1. You gained a lot of information in this experiment. What kind of jobs that people do might be affected by this kind of information? Could you ever use this kind of information when making a decision in your life? How?

Appendix 10. Judge's Survey

Thank you for serving as a judge in our Energy Afternoon.

This project was designed for a variety of reasons. In order to better assess how this project served the students' understanding and motivation, please answer the following questions.

1. How well were the students able to correctly identify the relationships between potential and kinetic energy in each of the tasks?
2. Were the students able to give an in depth explanation of the steps of the scientific method they used in order to perform each task? This could be found detailed in task 3, part 2; experimental design.
3. Were the students able to identify the problem solving techniques they used to troubleshoot their models?
4. How motivated did the team seem to be to share their work from the last 2 weeks?
5. In general, did everyone in the team take part in the judging or was it dominated by one or two students from the team?